Technical Specifications
for
Remediation Area 1, Phase II
Site Preparation and Remediation Package

FDF Project No. 90701
Document No. 20710 TS-0002

November 1997
Revision C
90 Percent Design Review

Environmental Remedial Action Project
Fernald Environmental Management Project
Fernald, Ohio
FDF Subcontract No. 2-21487
Project Order 175

175 Tri-County Parkway
Cincinnati, Ohio 45246

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U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

REMEDIATION AREA 1, PHASE II
SITE PREPARATION AND REMEDIATION PACKAGE
TECHNICAL SPECIFICATIONS

PARSONS

Approved by: _____

Carlton Schroeder, Project Manager Date

Date: 11/21/97
Rev.: C RE: CS

WBS No: 1.1.1.1.5
SCEP/175/A1PII

U.S. DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

WBS NO. 1.1.1.1.5
TECHNICAL SPECIFICATIONS

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U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

REMEDIATION AREA 1, PHASE II
SITE PREPARATION AND REMEDIATION PACKAGE
TECHNICAL SPECIFICATIONS

Division 1

PARSONS

Prepared by: _____
Date

Checked by: _____
Date

Date: 11/21/97 01010 WBS No: 1.1.1.1.5
Rev.: C RE: CS SCEP/175/A1PII

SECTION 01010
GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SCOPE

A. This specification and accompanying construction documents describe all work for the Remediation of Area 1, Phase II of the FEMP. The work includes, but is not limited to:

1. Installation and construction of erosion sediment control facilities including runon and runoff control ditches and silt fence and berm.
2. Construction of a sediment basin and associated inflow conveyance channel and outflow channel.
3. Clearing trees and brush and stump grinding.
4. Chipping trees and brush and stockpiling wood chips.
5. Surveying for excavation construction layout and as-built conditions.
6. Excavation, removal, and stockpiling of materials.
7. Construction of a radiological control area with trailer and parking area.
8. Removal of all at and below grade facilities and structures associated with the Sewage Treatment Plant, including size reduction and hauling and unloading at the OSDF.
9. Removal of existing utilities (except the main AWWTF discharge line) and size reduction and disposal at the OSDF.
10. Excavation and hauling of all below WAC, above FRL soils and unloading at the OSDF.
11. Excavation, handling, containerization (or bulk handling) of all above WAC or RCRA soils.
12. Collection and transfer to the AWWTF of all groundwater and stormwater associated with the excavation area of the STP. The water handling system construction includes tanks, pumps and piping.
13. Preparation of subgrade in ditches, basins, and stockpile areas.

14. Development, operation, and reclamation of a borrow area for backfilling of excavations.
15. Removal/installation/relocation of chain link fencing, installation of construction fencing, and radiological control fencing.
16. Construction of an equipment decontamination facility, and contractor provided wheel wash facilities.
17. Installation of a new electric power line and associated electrical work for project facilities.
18. Construction of stockpiles.
19. Dust control following an associated FDF approved plan.
20. Material identification and tracking.

B. In all cases where the words "Fluor Daniel Fernald, Incorporated" or "FDF" appear in these specifications, it shall be understood to refer to Fluor Daniel Fernald, Incorporated (FDF) Construction Manager.

C. In all cases where the words "A/E Subcontractor" or "Engineer" appear in these specifications, it shall be understood to refer to PARSONS or to such other individuals or organizations acting within the scope of the specific duties entrusted to them.

D. In all cases where the terms "Vendor" or "Seller" or "Manufacturer" or similar terms appear in these specifications or in the appendices to these specifications, they shall be understood to refer to an individual or firm(s) providing materials, equipment, or services.

E. In all cases where the term "Contractor" appears in these specifications, it shall be understood to refer to the construction contractor or subcontractors he may utilize.

F. The Contractor shall provide written procedures for FDF's review and approval of all plans and tests to be performed as identified in the drawings and specifications. These procedures shall provide detailed step-by-step operations with sign-off columns

and shall be submitted and approved prior to testing. Generally, all field test instruments shall have been calibrated, prior to use on this subcontract, by an independent calibration laboratory whose calibration equipment and instruments are fully traceable to National Institute of Science and Technology (NIST) standards. The Contractor shall maintain individual certification of calibration which evidences traceability to NIST standards for all field test instruments used on this subcontract.

G. Work shall be accomplished in accordance with the following code requirements:

1. Ohio Basic Building Code (OBBC) 1995.
2. Uniform Building Code (UBC) 1994.
3. Code for Safety to Life from Fire in Buildings and Structures (NFPA 101, Life Safety Code) - 1994.
4. All other National Fire Protection Association (NFPA) Codes - All inclusive, including 1996 revisions.
5. Occupational Safety and Health Administration (OSHA) - 29 CFR 1910 and 29 CFR 1926.
6. FDF Lockout/Tagout Procedure OP-0004.
7. Ohio Plumbing Code - 1993.

1.2 SITE AND SCOPE

A. The intent of these specifications is to provide all technical information required and necessary to perform and complete the work as required by the Contract.

B. The Contractor shall provide all labor, services, materials, and equipment, and shall do all work necessary to accomplish this within the limits of work as defined in the accepted bid and Contract.

1.3 LISTS OF MATERIALS, MANUFACTURERS, OR EQUIPMENT SUPPLIERS

A. The listing of materials, equipment, manufacturers' names, or equipment suppliers in these specifications in no way precludes the offerer from proposing alternate materials, equipment, manufacturers' names,

or equipment suppliers of any of the items to be furnished within the scope of these specifications, except where specifically precluded by these specifications. These lists are intended to identify the types and general quality of those items that will be included in the offerer's proposal. It is the offerer's responsibility to propose the materials, manufacturers' names, or equipment that is best suited for this project in combined terms of quality and price.

1.4 SUBMITTALS - SHOP DRAWINGS, SAMPLES, AND OTHER DATA

A. Section 01011 has the submittal listing. Refer to Part 6, Statement of Work and Part 7, technical specifications, and drawings for additional submittal requirements. The Contractor is responsible for providing all submittals required in the subcontract whether listed in Section 01011 or not. Any submittals not in conformance with these requirements will be returned without review for correction and resubmittal:

1. Safe Work Plan. The Safe Work Plan shall include general information and approach and will include specific documents described in the technical specifications.
2. Assemble and submit, if required, in logically arranged folders, the following:
   All instruction bulletins, diagrams, lubrication schedules, operating instructions, parts lists, and pamphlets for equipment and apparatus furnished, including vendor's or manufacturer's recommended procedure for lifting, handling, and installing equipment.
3. Submittals for equipment shall include manufacturer's catalog "cut sheets" or similar information bulletins indicating the model number or catalog number, ratings, size, weight, and performance curves and data. Indicate operating point on curves and tabular data for each piece of equipment that curves or data represent.
4. Submit wiring diagrams or connection diagrams for equipment items, accompanied by adequately defined symbols list. Schematic and wiring diagrams must

be prepared in accordance with ANSI/IEEE Publication Y32E, "Electrical and Electronics Graphics Symbols and Reference Designations." Individual 8-1/2 by 11-inch elementary and wiring drawings are not acceptable.

5. Indicate all performance data, construction material finishes, and modifications to manufacturer's standard design specified.
6. Locate termination points for all required external wiring.
7. Indicate roughing-in, foundation, and support point dimensions.
8. Submit written test procedures for all required testing. Include criteria for acceptable performance. Submit test reports after completion of tests.
9. Submit Material Safety Data Sheets (MSDSs), for all cutting oils, caulks, sealants, lubricants, paints, etc., and all other similar compounds.
10. The Engineer's review of such submittals shall not relieve the Contractor from any responsibility for deviations from contract drawings or specifications, unless the Contractor has in writing called FDF's attention to such deviations at the time of submission, nor shall it relieve the Contractor from responsibility for errors of any sort in the submittals nor from responsibility for the proper fitting and construction of the work.
11. Submittals will be reviewed with respect to such factors as quality of draftsmanship, legibility, and evidence that the Contractor is aware of the necessity and importance of adequately detailing and illustrating special features and conditions relating to the work. Dimensions, sizes, construction details, and directive notes shown will be reviewed for accuracy, compliance with the specifications, adequacy, interferences, etc., on a spot check or incomplete basis to establish that the Contractor has given such factors careful attention.
12. Any changes marked on submittals during review will be for the purpose of indicating the

requirements of the contract documents, and no change in the contract amount is authorized by such markings.

13. When submittals are found to be satisfactory with respect to the above factors and within the scope of the review outlined above, they will be returned by FDF to the Contractor bearing certificate attachment permitting the Contractor to employ them in the furtherance of the Contractor's work under the contract. The Contractor shall understand that such permission shall not relieve the Contractor of the responsibilities for the full performance of the work required under the contract in conformance with the contract documents governing such performance, nor for any other deficiencies in the submittals such as inaccuracies, discrepancies, omissions, interferences in the work itself, or with the work of other contractors, whether or not such deficiencies were observed or noted in the course of the review of the shop drawings.
14. The Contractor shall verify all field dimensions required for shop drawings.

1.5 REFERENCES

A. The publications listed in the technical specifications form part of this specification. Each publication shall be the latest revision and addendum in effect at the time of issue of contract and of issue of the specification unless notified otherwise. Except as modified herein or by the details of the drawings, work included in this specification shall conform to the applicable provisions of these publications.

1.6 MANUALS AND SPARE PARTS LISTS

A. Copies of manufacturers recommended spare parts list (including critical long-lead time spare parts) shall be submitted prior to the shipment of any item of equipment.

B. A Systems Implementation Manual shall be prepared so as to provide optimum readiness of the equipment and systems being furnished. The Systems Implementation Manual shall be coordinated with the requirements as noted in the accompanying Systems Plan.

C. The cover of the Systems Implementation Manual shall include the following information:
1. Project Title - Area 1, Phase II Remediation Project
2. WBS No. - 1.1.1.1.5
3. Engineer - PARSONS
4. Construction Manager - FDF
5. Contractor Name

D. The Systems Implementation Manual shall be bound into one or more volumes for ease of handling and shall have an index. The manual shall include descriptive literature, drawings, performance curves and rating data, test reports, and spare parts lists. The maintenance section shall divide maintenance procedures into two categories, "Preventive Procedures" and "Corrective Procedures," and a subsection for "Safety Precautions." Preventive maintenance shall include cleaning and adjustment instructions. Corrective Maintenance shall include instructions and data arranged in the normal sequence of corrective maintenance (i.e., troubleshooting) (logical effect to cause), then repair and replacement of parts, then the parts list. Safety Precautions shall comprise a list of safety precautions and instructions to be followed before, during, and after making repairs, adjustments, or routine maintenance.

E. Submit complete sets of the final approved manual prior to the shipment of the equipment or system.

1.7 SPECIFICATION EXPLANATION

A. General: The technical specifications are of the abbreviated, simplified, or streamlined type and include incomplete sentences. Omissions of words or phrases such as "the Contractor shall," "in conformity therewith," "shall be," "as noted on the drawings," "according to the plans," "a," "the," and "all" are intentional. Omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" occurs on the drawings.

The Contractor shall provide all items, articles, materials, operations, or methods listed, mentioned, or scheduled either on the drawings, or specified herein, or both, including all labor, materials, equipment, and incidentals necessary and required for their completion and installation unless stated otherwise.

For convenience of reference and to facilitate the letting of contracts, the specifications may be separated into titled divisions. Such separations, however, shall not operate to make the Engineer an arbitrator to establish the limits of subcontracts in any manner. The following defines the separations referred to in the specifications.

1. Division: Separate numbered division of specifications (e.g., Div. 16)
2. Section: Separate numbered section of a division (e.g., Sec. 16020)
3. Article: Separate numbered article of a section (e.g., Article 2.1)

B. Definitions: Certain terms and words as used throughout the specifications shall be defined as follows, unless otherwise particularly specified:

1. "Provide": Furnish and install, complete, in place.
2. "Indicated": As shown on the drawings and/or specified.

3. "Directed," "Authorized," "Permitted": Shall be as directed, authorized, or permitted by FDF.
4. "Selected": Shall be as selected by the Engineer or FDF.
5. "Satisfactory," "Acceptable": Satisfactory or acceptable to FDF.
6. "Necessary," "Required," "Suitable": As necessary, required, or suitable for the intended purpose as determined by FDF.
7. "Submit": Submit to FDF unless otherwise specified

1.8 ABBREVIATIONS FOR REFERENCED STANDARDS AND SPECIFICATIONS

A. The following list denotes abbreviations used in these technical specifications:

Abbreviation	Authority
AASHTO	American Association of State Highway and Transportation Officials.
ACI	American Concrete Institute
ADC	Air Diffusion Council
AFP	Active Flyash Pile
AGC	Associated General Contractors of America
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
APA	American Plywood Association

Abbreviation	Authority
API	American Petroleum Institute
ARI	Air Conditioning and Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CFR	Code of Federal Regulations
DHI	Door and Hardware Institute
FDF	Fluor Daniel Fernald, Incorporated
FGMA	Flat Glass Marketing Association
FM	Factory Mutual System
FRL	Final Remediation Level
GA	Gypsum Association
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
IFP	Inactive Flyash Pile
IMIAC	International Masonry Industry All-Weather Council
MBMA	Metal Building Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIST	National Institute of Science and Technology

Abbreviation	Authority
NPCA	National Paint and Coatings Association
OBBC	Ohio Basic Building Code
ODOT	Ohio Department of Transportation
OSDF	On-Site Disposal Facility
PACM	Presumed Asbestos Containing Material
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PDCA	Painting and Decorating Contractors of America
PIV	Post Indicator Valve
PS	United States Department of Commerce, Voluntary Products Standards
SDI	Steel Deck Institute
SF	South Field
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Steel Structures Painting Council
SWU	Southern Waste Units
UL	Underwriters Laboratories, Inc.
WURP	Waste Units Remediation Project

END OF SECTION

SECTION 01011
SUBMITTALS

1.1 SUBMITTAL REQUIREMENTS

A. Submittals required include drawings and/or data for all items listed below:

1. "AA" designates that items marked are special requirements, which are in the technical sections of the specifications.
2. "BB" designates that shop drawings are required.
3. "CC" designates that catalog cuts are required.
4. "DD" designates that Material Certificates are required.
5. "EE" designates that Certificates of Conformance are required.
6. "FF" designates that engineering calculations are required.
7. "GG" designates that spare parts list is required.
8. "HH" designates that an installation, operation, and maintenance manuals (IOM) are required.
9. "II" designates that the manufacturer's material safety data sheets (MSDS) are required.
10. "JJ" designates that wiring diagrams for power, signal, and control wiring are required.
11. "KK" indicates that tests are required.
12. "LL" indicates that test reports are required.
13. "MM" indicates that samples are required.
14. "NN" indicates to be included in the Safe Work Plan.

B. See attached sheets for Submittals.

END OF SECTION

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Section 01011 of Specifications
Submittals
Division 1 & 2

Material/Equipment/Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng Calcs FF	Spare Parts GG	IOM Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	Test Rpt LL	Samples MM	Safe Work Plan NN
SECTION 01010 - General Requirements														X
SECTION 02050 - Surveying														
Surveyor Qualifications	X													
As-Built Record Drawings	X													
Surveying Field Notes	X													
SECTION 02100 - Site Preparation														
Traffic Control Plan	X													
Dust Control Plan	X		X											
SECTION 02200 - Non-Impacted Material Excavation														
Fill Material	X			X										
Compaction Test	X										X			
As-built Drawing	X													
Dewatering Plan	X													
SECTION 02205 - Impacted Material Excavation and Handling												X		
Excavation Work Plan	X													
Qualification Summary	X													

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Attachment 1 to Section 01010 of Specifications
Submittal Listing
Division 2

Material/Equipment/Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng Calcs FF	Spare Parts GG	IOM Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	Test Rpt LL	Samples MM	Safe Work Plan NN
SECTION 02206 - General Earthwork, Backfilling and Interim Grading														
Material Source	X													
Name and Address of Soil Testing Laboratory	X													
SECTION 02210 - PACM														
PACM Handling Plan	X													
SECTION 02211 - Lead Contaminated Soil														
Conceptual Treatability Study Plan	X													
Treatability Study Work Plan	X													
Conceptual Stabilization Plan	X													
Treatability Study Report	X													
SECTION 02212 - Material Identification and Documentation														
Material Documentation Work Plan	X					X								X
List of Haul Equipment	X													
List of Material Personnel	X													

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Attachment 1 to Section 01010 of Specifications
Submittal Listing
Division 2

Material/Equipment/Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng Calcs FF	Spare Parts GG	IOM Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	Test Rpt LL	Samples MM	Safe Work Plan NN
SECTION 02270 - Erosion and Sediment Control			X		X									
Surface Water Management and Erosion and Sedimentation Control Plan	X													
SECTION 02506 - Aggregate Surface				X										
Material Source	X													
Name and Address of Soil Testing Laboratory	X													
SECTION 02668 - Remediation Generated Water Transfer Lines			X	X										
SECTION 02720 - Storm Drain Piping			X	X										
Project Record Documents	X													
SECTION 02850 - Equipment Decontamination Facility		X	X	X				X			X		X	
Equipment Decontamination Plan	X													
SECTION 02900 - Soil Preparation and Seeding			X					X	X					
Proposed seed mixtures, mulch, asphalt emulsion, tackifier, and fertilizers	X													

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Attachment 1 to Section 01010 of Specifications
Submittal Listing
Division 2

Material/Equipment/Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng Calcs FF	Spare Parts GG	IOM Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	Test Rpt LL	Samples MM	Safe Work Plan NN
SECTION 02999 - Misc. & Specialty Items														
Construction Fence	X													
Caution Signs	X													
Buoys	X													

Note: All MSDSs shall be submitted for all hazardous chemicals as required by General Requirements Specification 01010, Article 1.4, Paragraph A.8.

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Section 01011 of Specifications
Submittals
Division 3

Material/Equipment/Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng Calcs FF	Spare Parts GG	IOM Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	Test Rpt LL	Samples MM	Safe Work Plan NN
SECTION 03316 - Concrete Removal														
Concrete Removal Work Plan	X													

Note: All MSDSs shall be submitted for all hazardous chemicals as required by General Requirements Specification 01010, Article 1.4, Paragraph A.8.

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Section 01011 of Specifications
Submittals
Division 13

Material/Equipment/Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng Calcs FF	Spare Parts GG	IOM Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	Test Rpt LL	Samples MM	Safe Work Plan NN
SECTION 13125 - Modular Radiological Control Facility														
Support Location Plan		X	X											
Wall and Roof System Dimensions and Construction Details		X	X											
Down Spout/Splash Block Locations		X	X											
Tie-Down Location Plan and Details		X	X											
Product Data- Mechanical Components		X	X					X		X		X		
Manufacturers Installation Instructions	X	X	X					X		X				
SECTION 13205 - Tanks		X	X					X			X			
SECTION 13400 - Instrumentation and Equipment		X	X		X		X	X				X		
SECTION 13405 - Installation and Calibration of Instruments			X	X				X			X	X		

Note: All MSDSs shall be submitted for all hazardous chemicals as required by General Requirements Specification 01010, Article 1.4, Paragraph A.8.

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Section 01011 of Specifications
Submittals
Division 15

Material/Equipment/Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng Calcs FF	Spare Parts GG	IOM Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	Test Rpt LL	Samples MM	Safe Work Plan NN
SECTION 15060 - Pipe, Fittings, Valves, and Accessories	X	X	X		X			X			X	X		
SECTION 15160 - Transfer Pumps			X		X		X	X						
SECTION 15170 - Motors			X									X		

Note: All MSDSs shall be submitted for all hazardous chemicals as required by General Requirements Specification 01010, Article 1.4, Paragraph A.8.

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ERA PROJECT

Section 01011 of Specifications
Submittals
Division 16

Material/Equipment/ Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng'g Calcs FF	Spare Parts GG	Systems Implem Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	Test Rpt LL	Samples MM	Safe Work Plan NN
SECTION 16050														
Circuit Breaking for Existing Substation			X		X									
Disconnect Switches			X		X					X				
Combination Magnetic Motor Starters			X		X					X				
Selector Switches			X		X									
Receptacles			X		X									
Relays			X		X									
Conduit			X		X									
Wire and Cable			X		X									
Instrument Cable			X		X									
Nameplates			X		X									
Wire Markers			X		X									
Wireway and Aux. Cutters			X		X									
Splicing and Term. Components			X		X									
Boxes			X		X									
Cabinets			X		X									
Supporting Devices			X		X									
Underground Warning Tape			X		X									
Inspection and Testing											X	X		

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Section 01011 of Specifications
Submittals
Division 16

Material/Equipment/ Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng'g Calcs FF	Spare Parts GG	Systems Implem Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	Test Rpt LL	Samples MM	Safe Work Plan NN
SECTION 16118														
Conduit and Fittings			X		X									
Warning Tape			X		X									
SECTION 16170														
Grounding Electrodes and Conductors			X	X										
Equipment Grounding Conductors			X	X										
Testing Equipment Certification	X													
Ground System Testing											X	X		
SECTION 16370														
Poles			X		X									
Pole Hardware			X		X									
Line Conductors			X		X									
Anchors			X		X									

Section 01011 of Specifications
Submittals
Division 16

Material/Equipment/ Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng'g Calcs FF	Spare Parts GG	Systems Implem Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	Test Rpt LL	Samples MM	Safe Work Plan NN
SECTION 16462														
Transformer/Panelboards		X	X		X		X	X		X	X	X		

Note: All MSDSs shall be submitted for all hazardous chemicals as required by General Requirements Specification 01010, Article 1.4, Paragraph A.8.

SECTION 01012
SCHEDULE OF DRAWINGS

1.1 DRAWINGS

A. The following drawings are hereby made a part of this contract:

	DRAWING NO.	SHEET #	REV. #	DRAWING TITLE
1	92X-5900-X-00415	X0001	E	Project Title Sheet
2	92X-5900-X-00418	X0002	E	Drawing Index
3	92X-5900-X-00420	X0003	E	Legend and General Notes
4	92X-5900-G-00421	G0001	E	Civil - Existing Conditions Plan
5	92X-5900-G-00428	G0002	E	Civil - Master Site Plan
6	92X-5900-G-00434	G0003	E	Civil-Site Plan-Sewage Treatment Plant (Existing)
7	92X-5900-G-00435	G0004	E	Civil-Site Plan-Dissolved Oxygen Facility
8	92X-5900-G-00436	G0005	E	Civil - Site Plan, Trap Range
9	92X-5900-G-00433	G0006	E	Civil - Site Plan, Tank Farm
10	92X-5900-G-00463	G0007	D	Civil - Excavation Plan-Sewage Treatment Plant
11	92X-5900-G-00456	G0008	C	Civil - Interim Grading Plan - Sewage Treatment Plant Area
12	92X-5900-G-00455	G0009	C	Civil - Interim Grading Plan, Area 1, Phase I Sediment Traps
13	92X-5900-G-00457	G0010	C	Civil - Typical Cross Sections
14	92X-5900-G-00459	G0011	C	Civil - Traffic Plan
15	92X-5900-G-00458	G0012	C	Civil - Haul Road Layout
16	92X-5900-G-00460	G0013	C	Civil - Remediation Generated Water Transfer Line
17	92X-5900-G-00432	G0014	E	Civil - Sediment Basin Plan
18	92X-5900-G-00461	G0015	C	Civil - Sediment Basin - Sections and Details

	DRAWING NO.	SHEET #	REV. #	DRAWING TITLE
19	92X-5900-G-00466	G0016	C	Civil - Conveyance Channel Plan
20	92X-5900-G-00467	G0017	C	Civil - Erosion and Sediment Control - Notes and Details
21	92X-5900-G-00468	G0018	C	Civil - Material Tracking Plan
22	92X-5900-G-00469	G0019	C	Civil - Detail Sheet
23	92X-5900-G-00477	G0020	B	Civil - Access Control - Sector 1
24	92X-5900-G-00479	G0021	B	Civil - Access Control - Sector 2
25	92X-5900-G-00480	G0022	B	Civil - Access Control - Sector 3
26	92X-5900-G-00482	G0023	A	Civil - Equipment Decontamination Facility
27	92X-5900-G-00484	G0024	A	Civil - Existing Subsurface Feature Plan
28	92X-5900-G-00485	G0025	A	Civil - Plan and Subsurface Profile - Sediment Basin
29	92X-5900-E-00472	E0001	C	Electrical - Single Line Diagram
30	92X-5900-E-00471	E0002	C	Electrical - Elementary Diagrams
31	92X-5900-E-00473	E0003	C	Electrical - Power Plan
32	92X-5900-E-00476	E0004	C	Electrical - Interconnection Diagram
33	92X-5900-E-00478	E0005	B	Electrical - Elevations and Details
34	92X-5900-N-00464	N0001	C	Piping and Instrumentation Diagram - Symbols and Legend
35	92X-5900-N-00465	N0002	C	Piping and Instrumentation Diagram - Water Collection and Transfer System
36	92X-5900-P-00474	P0001	C	Piping Plan - Receiving Tanks and Transfer System
37	92X-5900-P-00475	P0002	C	Piping - Sections and Details

U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

REMEDIATION AREA 1, PHASE II
SITE PREPARATION AND REMEDIATION PACKAGE
TECHNICAL SPECIFICATIONS

Division 2

PARSONS

Prepared by: _____
Date

Checked by: _____
Date

SECTION 02050
SURVEYING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Establishing survey benchmarks and baselines.

B. Setting limits and boundaries of construction activities.

C. Performing surveys for:
   1. verification of the existing conditions.
   2. support surveys during the construction activities.
   3. measurement and payment.
   4. conformance checks.

D. Preparing and furnishing as-built construction drawings.

1.2 RELATED SECTIONS AND PLANS

A. Section 01010 - General Requirements.

B. Section 02100 - Site Preparation.

C. Section 02205 - Impacted Material Excavation and Handling.

D. Section 02270 - Erosion and Sediment Control.

E. Part 6 - Statement of Work.

F. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

A. National Geodetic Survey Standards.

1.4 QUALIFICATION

A. Survey work shall be supervised and certified by a Land Surveyor licensed in the State of Ohio. Survey work shall be in accordance with accepted surveying practices, provisions herein, and subject to the Construction Manager's approval.

B. Work performed in referencing or re-establishment of Fernald Environmental Management Project (FEMP) or United States survey monuments shall be stamped/certified by an Ohio licensed land surveyor.

1.5 SUBMITTALS

A. Submit qualifications for land surveyor licensed in the State of Ohio to the Construction Manager within 10 calendar days from Notice to Proceed for review and approval.

B. On request by the Construction Manager, submit documentation verifying accuracy of survey work.

C. Submit survey notes, field notes, sketches and drawings for the following surveys:

1. Preliminary surveys.
2. Prior to commencement of site preparation, erosion and sediment control and excavation.
3. Intermediate surveys.
4. At completion of excavation of Sludge Drying beds and for lead contaminated soils.
5. At the completion of sediment basin, conveyance channel and ditches.
6. At completion of Contract.
7. Measurement and payment surveys.
8. Final surveys.

D. Submit two (2) copies of field notes, (i.e. duplicate originals) sketches and drawings prepared by the licensed Land Surveyor, to the Construction Manager on a weekly basis or upon request by the Construction Manager. Field notes shall be legibly recorded on standardized field note books. Notation shall be consistently applied to survey work; the stake marking format and the field book notation shall be compatible. Identify survey benchmarks on the field notes, sketches and drawings.

E. Upon completion of the survey work, provide the Construction Manager the original field note books, layout, computations, certified sketches and drawings in Intergraph Microstation (version 5.0 or later) ".dgn" files.

F. Submittal requirements for the environmental health and safety requirements shall be as specified in Part 8 of Contract Document.

1.6 PROJECT RECORD DOCUMENTS

A. Maintain on site a complete and accurate log documenting survey work as it progresses.

B. Maintain on site drawings clearly showing survey benchmarks and baselines.

C. Maintain on site an accurate and current set of red-line drawings with as-built locations. Data shall be incorporated within one week of completion of the respective construction activity.

1.7 EXAMINATION

A. Prior to the start of work, verify the accuracy of the existing conditions shown on the Construction Drawings. Immediately notify the Construction Manager in writing of deviations from the existing conditions indicated on the Construction Drawings.

B. Verify the existing structures, utilities, wells, topography, erosion and sediment control measures, construction and radiological control fences, retention basins and appurtenances and drainage features shown on the Construction Drawings and notify the Construction Manager of any differences or conflicts with proposed work with the Construction Manager.

C. Stake the locations, as shown on the Construction Drawings, of excavations and review proposed work with the Construction Manager in the field.

1.8 SURVEY BENCHMARKS

A. Locate and verify benchmarks as shown on the Construction Drawings in accordance with this Section.

B. Protect and preserve benchmarks.

C. Replace benchmarks disturbed or damaged by Contractor at no additional cost to FDF.

1.9 HEALTH AND SAFETY REQUIREMENTS

A. Environmental Health and Safety, and Training requirements shall be as specified in Part 8 of Contract Document.

PART 2 PRODUCTS

A. The accuracy of horizontal and vertical control shall meet or exceed Third-Order, Class I and Third-Order, respectively, as defined by National Geodetic Survey Standards. Elevation shall be referenced to National Geodetic Vertical Datum (NGVD) of 1929 and horizontal coordinates to North American Datum (NAD) 1983.

B. Provide materials as required to perform the surveys, including, but not limited to: instruments, tapes, rods, measures, mounts, tripods, stakes, hubs, nails, ribbon, and other reference markers.

C. The survey instruments shall be precise and accurate to meet the needs of the project. Survey instruments shall be capable of reading to a precision of 0.01 feet with a setting accuracy of 8 seconds.

PART 3 EXECUTION

3.1 GENERAL

A. Establish elevations, lines, and levels. Locate and lay out by instrumentation and similar appropriate means. Topographic contours are shown to nearest foot. Field run data shall be taken to adjacent existing undisturbed area (100 ft. minimum overlap) to create a smooth contour transition.

B. Maintain accurate and complete notes of surveys:
   1. Handwritten survey notes and information shall be written with lead pencil(s) and entered in "write in rain" notebooks. A copy of the numbered, dated and signed field book pages shall be given to the Construction Manager weekly, or upon request, for use in reviewing the work.
   2. Electronically collected field survey information shall be collected and backup equipment shall be available in the event of equipment malfunction.
      a. Electronic format for printed output of data collectors field survey notes shall be compatible with the field book notation format.
      b. Electronic format for printed output of data collectors field work shall be compatible with the Contractor's and Construction Manager's computer equipment and software for reviewing the work. A copy of the data disk shall be submitted to the Construction Manager monthly or upon request.

C. Perform construction layout surveys in advance of scheduled construction activities. The Contractor is responsible for rework and/or construction delays caused by survey or staking errors.

D. Set grade stakes and slope stakes in accordance with accepted surveying practices.

E. Set grade stakes for construction activities as the work progresses.

F. Establish temporary survey benchmarks, as necessary, to support construction activities.

G. Benchmarks, Accuracy and Documentation:

1. Record the following information in survey notebooks for each benchmark established:
   a. Designation of survey benchmark;
   b. State Planer North American Datum (NAD);
   c. Elevation based on NGVD;
   d. Date of establishment;
   e. Description and sketch of survey benchmark location; and
   f. Survey benchmarks shall be referenced to a minimum of three features that can be seen from the survey benchmark.
2. Document survey work in the field notebooks using the format and procedures described below:
   a. Title and consecutive notebook number on the front cover;
   b. Consecutively numbered pages;
   c. Table of contents, indicated by survey task, on the first numbered page;
   d. Legend indicating symbols and abbreviations used in survey notes;
   e. Names of survey team for each task;
   f. Notes on weather, equipment, etc.;
   g. Date and time on each page to indicate when work was recorded;
   h. Notes in a uniform character such that they can be interpreted and used by anyone with

survey knowledge;

i. Description and/or sketches of the existing survey control used.

3.2 SUPPORT SURVEYS

A. Preliminary Surveys:

1. Verify location of the existing survey benchmarks and the existing conditions specified in this Section prior to starting work.
2. Establish location for the installation of the erosion and sediment control measures specified in Section 02720.
3. Establish limits of excavations shown on the drawings. Similarly provide the located and extent of all stockpile areas. Maximum staking interval shall be 50 feet unless otherwise approved by the Construction Manager.
4. Establish Construction Limits required for installation of the access control fencing, construction fencing and radiological control fencing as specified in Section 02100 and as shown on the Construction Drawings.
5. Perform surveys for conformance checks as specified in this Section.

B. Intermediate Surveys:

1. Perform surveys during progress of the construction activities to verify the accuracy of field work and as directed by the Construction Manager.
2. Perform surveys for measurement and periodic progress payment as specified in this Section.

3. Perform surveys during progress of excavation to confirm limits of the excavation.
4. Perform conformance check surveys as specified in this Section.

C. Final Surveys:
1. Final topographic survey shall be at minimum one foot countour intervals. Additionally, the following points shall be surveyed and noted as applicable.
   a. Grade breaks.
   b. Points of horizontal curvature and tangency.
   c. Roads, ditches, pipes, channels and fences: Stake, such that layout remains undisturbed.
   d. Limits of final excavation.
2. Perform survey for conformance checks as specified in this Section.
3. Perform survey for final measurement and payment.

3.3 SURVEYS FOR MEASUREMENT AND PAYMENT

A. Perform surveys for periodic progress payments and final payment to determine quantities of work.

B. Calculate and certify quantities of work and submit survey notes and calculations to the Construction Manager for review, evaluation and payment.

C. Measurement and payment surveys for elevation and for horizontal distance shall be to the nearest 0.1 foot +/- 0.05 foot.

3.4 SURVEYS FOR CONFORMANCE CHECKS

A. Perform conformance check surveys immediately upon completion of a given construction activity. Provide the following minimum spacings and locations for survey points:

1. A line of survey points spaced not more than 50 feet apart shall be taken, including along grade breaks (this will include the inside edge and outside edge of any bench on a slope);
2. A line of survey points spaced not more than 50 feet apart shall be taken at the top of any pipes and any appurtenances, and at the top and invert of any storm culverts.

B. Conformance check surveys for elevation and for horizontal coordinates shall be to the nearest 0.01 foot and for angles to the nearest 20 seconds.

END OF SECTION

SECTION 02100
SITE PREPARATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of surface debris.

B. Clearing of plant life, including removal of trees and shrubs and their root systems in areas affected by construction.

C. Tie-in to existing utilities as shown on Construction Drawings.

D. Topsoil excavation and stockpiling.

E. Removal of existing fencing.

F. Dust control.

G. Traffic Control and requirements for the Traffic Control Plan.

H. Protection of existing groundwater monitoring wells, OSDF construction well, air monitoring stations and benchmarks.

I. Access to certified, construction, and radiological control areas.

J. Installation of access fencing.

1.2 RELATED SECTIONS AND PLANS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 01012 - Schedule of Drawings.

D. Section 02050 - Surveying.

E. Section 02200 - Non-Impacted Material Excavation.

F. Section 02205 - Impacted Material Excavation and Handling.

G. Section 02270 - Erosion and Sediment Control.

H. Part 6 - Statement of Work.

I. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. State of Ohio, Department of Transportation, Construction and Material Specifications, January 1, 1997 (ODOT). Except as supplemented or otherwise modified herein and/or shown on the construction drawings, the entire work under this section shall be in compliance with the provision of ODOT.

B. Sitewide Excavation Plan, July 1997, Revision C.

C. Area 1, Phase II, Southern Waste Units Implementation Plan for Operable Unit 2, November 1997, Revision C.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. Prior to initiating site clearing or earth-moving operations, the Contractor shall submit a dust control plan for approval by Construction Manager. Along with the plan, the manufacturer's Material Safety Data Sheets (MSDS), and recommendations for material handling and usage for any proposed additives within the water sprays

shall be submitted to the Construction Manager for approval.

C. Submit a Traffic Plan for all work within 10 calendar days from the Notice to Proceed for approval by the Construction Manager. The traffic plan shall include as a minimum:

1. Planned traffic routes for hauling excavated impacted material from each sector of Area 1, Phase II to the On Site Disposal Facility (OSDF).
2. Access from interim stockpiles to the haul roads.
3. Planned crossings of South Access Road and OSDF Borrow Haul Road including provisions to notify Construction Manager one month before first crossing.
4. Planned traffic routes within the Area 1, Phase II sectors.
5. Planned traffic routes around and through certified areas.
6. Planned crossings of major utilities (such as the a trench for new remediation generated water transfer line in production area). The crossing protection should be at a minimum, a 1-inch thick steel plate or an equivalent alternative. Length and width of steel plate shall be as required to protect the existing utilities. Provide calculations to support equivalent alternatives to the 1-inch thick steel plate.
7. Coordination of work in utility easements (such as CG&E and Midvalley Oil).
8. Description of impact to traffic control during long breaks in work.
9. Access control to and from radiological controlled areas and certified areas.
10. Controls for crossing OSDF Borrow Haul Road will be provided by others.

D. Within 10 calendar days from the Notice to Proceed, submit a Dust Control Plan in accordance with Part 6 for approval by the Construction Manager.

E. Within 10 calendar days from the Notice to Proceed, submit an Environmental Monitoring and Related Facilities Protection Plan, which describes the methods and details for protection of existing groundwater monitoring wells, OSDF construction well, air monitoring stations, benchmarks during construction activities to Construction Manager for approval.

1.6 HEALTH AND SAFETY REQUIREMENTS

Environmental Health and Safety, and Training requirements shall be as specified in Part 8 of Contract Documents.

PART 2 PRODUCTS

2.1 MATERIALS

A. Crusting Agent: See Section 02270.

B. Materials for traffic control shall be as defined by the Traffic Plan and shall conform to ODOT specifications unless otherwise approved by the Construction Manager.

C. Construction access control fence shall be orange, high density polyethylene, opening size approximately 4 inches by 1/2 inch, minimum tensile strength of 2000 lbs/ft of width. Posts shall be steel "T" as indicated on the Construction Drawings.

D. Radiological control fence shall be as specified for construction fence, except the color shall be yellow.

E. Gates as specified on the Construction Drawings.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify existing conditions as specified in Section 02050.

B. Verify that all utilities to be removed or tapped have been properly isolated and drained (valve turned closed and locked) prior to commencement of work. Construction Manager is to properly isolate and drain utilities (to empty pipe) that are to be abandoned or connected.

C. Install perimeter erosion and sediment control measures in accordance with Section 02270 prior to any clearing or grading activities.

D. The radiological control facility shall be installed in the general location shown on the Construction Drawings, and coordinated with the Construction Manager. Trailer tie down requirements are provided in Part 6.

3.2 DUST CONTROL

A. Dust control shall be as specified in Part 6 of the Contract Documents and the Dust Control Plan. Dust control shall be provided during excavation, segregation, size reduction, loading, hauling, transferring, unloading, and other related activities and during off-hours as specified in Part 6 of the Contract Documents.

3.3 CONSTRUCTION AND RADIOLOGICAL CONTROL FENCING

A. Prior to initiating excavation activities install and relocate construction and radiological control fencing as shown on the Construction Drawings and as specified in Part 8.

B. Maintain and repair construction and radiological control fences until completion of the Contract.

C. Install construction fencing along the Access Control Areas as designated on the Construction Drawings.

3.4 ERECTION/INSTALLATION/APPLICATION

A. Clearing:

1. Clear only the area within each Sector approximately 10 feet beyond the six inch stripping limits and other areas required for

access to site and execution of work. Obtain written approval of clearing limits from Construction Manager.

2. Remove trees less than 4 inches diameter, shrubs, and woody undergrowth. The Contractor shall not disturb trees greater than 4-inches, if possible.
3. All trees, shrubs, and other vegetation within the impacted area (as defined in Section 02200) shall be cut a foot above grade, hauled to Woodchip Stockpile area and handled as a clean material, chipped, shredded, and placed in the Woodchip Stockpile as shown on the Construction Drawings. Minimize contact with ground to prevent contamination of fallen trees. Dragging or pushing trees is not permitted. The Woodchip Stockpile is to be turned over as necessary to prevent combustion. The removal of the rest of material shall be done in accordance with Section 02205.

B. Removal:
1. All pavement designated for removal shall be saw cut full depth prior to removal. Adjacent pavement to remain shall be protected. If pavement edge at cut breaks off, the pieces shall be removed and replaced.
2. Pavement shall be disposed of as debris in accordance with Section 02205.

C. Topsoil Excavation in Non-impacted Areas (as defined in Section 02200):
1. Excavate topsoil from the designated construction areas limits only.
2. Excavate topsoil in such a manner as to prevent or minimize intermingling with underlying subsoil or other objectionable material.
3. The top six inches of all excavation shall not be reused except for that removed from the Conveyance Channel, Area 1, Phase II (A1PII) Sediment Basin, and Outfall Area. Reusable topsoil material is to

be stockpiled in Topsoil Stockpile Area shown on Construction Drawings. Stockpile and provide erosion control in accordance Section 02270.

D. Topsoil excavation in impacted areas (as defined in Section 02205) shall be done in accordance with Section 02205.

E. Debris: Debris, as defined in Section 02205, encountered during excavation of topsoil shall be segregated and stockpiled as designated by Construction Manager.

F. Special Material: Special material, as defined in Section 02205, if encountered during excavation of topsoil, shall be handled in accordance with Section 02205.

3.5 PROTECTION

A. Locate, identify, and protect from damage all utilities that remain.

B. Protect trees, plant growth, and features that are outside the areas necessary for stripping, excavating, filling, or other grading work.

C. Protect survey benchmarks, groundwater monitoring wells, OSDF construction well, air monitoring stations and other existing structures to remain from damage or displacement.

D. Construct temporary roads and maintain existing roadways at the construction site, and provide dust control in accordance with approved Dust Control Plan.

3.6 TRAFFIC PLAN

A. Traffic control during the contract period shall be in accordance with the approved Traffic Plan.

3.7 PROTECTION OF THE EXISTING FACILITIES

A. Prior to commencing excavation activities in an area, install a protective barrier around existing groundwater monitoring wells, OSDF construction well, and air monitoring stations designated to remain as shown on the Construction Drawings. If excavation is to occur in proximity of monitoring wells and/or extraction wells designated to remain, hand excavate the area within the protective barrier. If damage to existing facilities occurs, repairs and/or replacement will be completed by Construction Manager at the Contractor's expense.

END OF SECTION

SECTION 02200
NON-IMPACTED MATERIAL EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Site excavation.

B. Excavation of trenches for storm culverts, drainage ditches, conveyance channels, sediment basin, outfall, electric cables, and remediation generated water transfer line.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 01012 - Schedule of Drawings.

D. Section 02050 - Surveying.

E. Section 02100 - Site Preparation.

F. Section 02205 - Impacted Material Excavation and Handling.

G. Section 02206 - General Earthwork, Backfilling and Interim Grading.

H. Section 02270 - Erosion and Sediment Control.

I. Section 02720 - Storm Drain Piping.

J. Section 02900 - Soil Preparation and Seeding.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. State of Ohio, Department of Transportation (ODOT):
   1. Construction and Material Specifications, January 1, 1997. Except as supplemented or otherwise modified herein and/or shown on the construction drawings, the entire work under this section shall be in compliance with the provisions of ODOT.

B. Occupational Safety and Health Administration, Code of Federal Regulations (CFR):
   1. 29 CFR 1926.650 Subpart P - Excavations, latest revision.

1.5 DEFINITIONS

A. Non-Impacted Material: Non-impacted material is defined as soil and debris, including sediment accumulated in sediment basins, ditches and at erosion and sediment control measures, with contamination levels below the established Final Remediation Levels (FRLs).

1.6 SYSTEM DESCRIPTION

A. This section involves earthwork, excavation of non-impacted material, and trenching relating to the utility lines, not covered in Section 02205.

1.7 SUBMITTALS

A. Provide submittals as required in Section 01011.

B. Contractor shall submit a Borrow Area Sequencing Plan ninety (90) days prior to commencing STP backfill activities. The plan shall address, as a minimum:
   1. Stockpiling of topsoil for reuse.
   2. Surface water controls.

3. Construction fencing.
4. Sequence of work.
5. Haul Route; including proposed design for oil pipeline crossing.
6. Final grading and temporary seeding.

PART 2 PRODUCTS

2.1 MATERIAL

A. Geotextile: See Section 02270.

2.2 EQUIPMENT

A. Provide equipment of size and type to excavate, load, haul, and unload non-impacted material to meet the contract requirements.

PART 3 EXECUTION

3.1 PREPARATION

A. Identify, flag, maintain, and protect existing utilities and features to remain in the construction area.

B. Survey Layout: Assure that all work is laid out and built in accordance with the requirements on the construction drawings and these specifications. Survey work shall be in accordance with Section 02050.

C. Do not disturb and immediately notify Construction Manager if other utility lines not shown on the Construction Drawings and/or reference drawings are encountered during trenching.

D. Install erosion and sediment control measures in accordance with Section 02270 prior to start of any earthmoving operations.

E. Install geotextile under Soil Stockpiles, as located on Construction Drawings.

F. Backfilling, if required, shall be done in accordance with Specification 02206.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Borrow Area Development

1. The area designated for Area 1, Phase II borrow material development is shown on the construction drawings. The soil material is anticipated to be similar to that shown in the OSDF Borrow Area Report.
2. The final grade shall be directed away from the terrace face (i.e., to the west) to the extent feasible.
3. Final slopes shall be a maximum of 6H:1V.
4. Excavation is not allowed within 50 feet of the Midvalley Oil Pipeline Right of Way.
5. Borrow material may also be acquired from Soil Stockpiles as approved by the Construction Manager.

B. Excavation:

1. Excavate subsoil required to accommodate foundations, gravel, paving, site structures, drainage features, utilities and construction operations as shown on the Construction Drawings.
2. Trenches and excavations shall be in accordance with OSHA 29 CFR 1926.650, Subpart P - Excavations.
3. Unauthorized excavation shall be backfilled in accordance with Section 02206, or otherwise corrected as approved by Construction Manager at Contractor's expense. Backfill shall be compacted earth from Soil Stockpile as approved by Construction Manager.
4. Stockpile non-impacted excess soil in the area designated as Soil Stockpile on the Construction Drawings and as directed by Construction Manager.

5. Perform grading and other operations to maintain site drainage. No water shall be permitted to accumulate in excavations, especially under structures, paved areas, behind roads or equipment pads. Control water by means of ditches, dams, temporary pumps and piping, plastic coverings, tarps, or other methods acceptable to Construction Manager. Water is to be handled in accordance with approved plan. See Section 02720 for permanent storm drains.
6. Excavated areas that are unsuitable for concrete shall be undercut, backfilled, and compacted as specified in Section 02206.
7. Excavate trenches to a width necessary for proper installation of pipe to be accommodated as shown on the Construction Drawings.
8. Grade bottom of trench to provide uniform bearing and support pipe on properly compacted bedding throughout length of pipe except where necessary to hand excavate for coupling for proper sealing of pipe joints.
9. Keep trench bottom free of standing water. Provide dewatering pumps as required.
10. Notify Construction Manager immediately of unexpected subsurface conditions.
11. Remove soft, spongy, or otherwise unstable materials encountered at elevation of pipe which will not provide a firm foundation for the pipe. Extend bedding depth as necessary to reach firm materials.

C. Topsoil excavation in non-impacted areas shall be done in accordance with Section 02100.

D. Excavation in impacted areas shall be done in accordance with Section 02205.

E. Backfilling for trenches shall be done in accordance with Section 02206. Pipe Bedding shall be A3 in accordance with Section 02206.

F. Seeding disturbed areas shall be done in accordance with Section 02900.

G. Each soil stockpile shall contain a maximum of 5,000 cubic yards with maximum height of 20 feet and side slopes of 2H:1V. At the end of each work day and upon completion of the stockpile, contractor shall make two passes over the work area of the pile with available equipment, as approved by the Construction Manager.

H. For Pavement Removal and Dust Control see Section 02100.

I. Debris: Debris encountered during excavation shall be segregated and stockpiled as designated by Construction Manager.

J. Special Material: Special material, if encountered during excavation, shall be handled in accordance with Section 02205.

3.3 FIELD QUALITY CONTROL

A. Compaction testing will be in accordance with Section 02206.

B. See Section 02205 for grading tolerance.

3.4 PROTECTION

A. Grade excavation and trench top perimeter to prevent surface water runoff from entering into excavation or to adjacent properties.

B. Protect excavation by methods required to prevent cave-in or loose soil from falling into excavation.

C. Protect finished work, existing features, and landscaping which will remain.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Provide erosion and sediment control in accordance with Section 02270 prior to start of any earth moving.

F. Protect existing groundwater monitoring wells and extraction wells in the area and in the vicinity of the work area in accordance with Section 02100.

G. Prevent contact between and/or mixing of impacted material (see Section 02205 for definition) and non-impacted material.

END OF SECTION

SECTION 02205
IMPACTED MATERIAL EXCAVATION AND HANDLING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for excavation, loading, hauling, and transferring to the OSDF of impacted materials encountered during the Remediation of Area 1, Phase II Project (A1PII), which includes unclassified impacted material, above Waste Acceptance Criteria (WAC) material, stabilized lead contaminated soil, special material, and sediment.

B. Excavation, loading, and containerizing Above WAC Material from the Sludge Drying Beds and staging of these containers in the Special Material Transfer Area shown on the Construction Drawings.

C. Excavation of additional Above WAC Material, if encountered, and loading, hauling, and placing material in the OU-1 Stockpile Area shown on the Construction Drawings.

D. Loading of Special Materials, if encountered, and transferring to the Special Material Transfer Area shown on the Construction Drawings.

E. Grinding the stumps in place in the impacted areas.

F. Requirements for excavation and handling of abandoned underground utility lines, including but not limited to drinking water (DW), fireline (FQ), effluent (FT), fuel gas (FG), and electrical duct.

G. Requirements for excavation and handling of other impacted material and debris encountered during excavation beyond the limits shown on the Construction Drawings, if required.

H. Removal, if required by the Construction Manager, of accumulated sediment in Sediment Basins 1 and Area 1, Phase II sediment traps 2 and 3 as shown on Construction Drawings, and hauling and unloading this material to the OSDF.

I. Supplemental excavation, as required, during pre-certification and certification.

1.2 RELATED SECTIONS

A. Section 01011 - Submittals.

B. Section 01012 - Schedule of Drawings.

C. Section 02050 - Surveying.

D. Section 02100 - Site Preparation.

E. Section 02200 - Non-Impacted Material Excavation.

F. Section 02206 - General Earthwork, Backfilling and Interim Grading.

G. Section 02210 - Separation and Packaging of Presumed Asbestos Containing Materials (PACM).

H. Section 02211 - Lead Contaminated Soil.

I. Section 02212 - Material Identification and Documentation.

J. Section 02270 - Erosion and Sediment Control.

K. Section 02850 - Equipment Wash Facility.

L. Section 02900 - Soil Preparation and Seeding.

M. Section 03316 - Concrete Removal.

N. Part 6 - Statement of Work.

O. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. Sitewide Excavation Plan, July 1997, Revision C.

B. Impacted Materials Placement Plan (IMPP), On Site Disposal Facility, August 1997, Revision H.

C. State of Ohio, Department of Transportation (ODOT): Construction and Material Specifications, January 1, 1997. Except as supplemented or otherwise modified herein and/or shown on the construction drawings, the entire work under this section shall be in compliance with the provisions of ODOT.

D. Area 1, Phase II Implementation Plan for Operable Unit 2, October 1997, Revision 0.

E. Waste Acceptance Criteria (WAC) Attainment Plan for On Site Disposal Facility, August 1997, Revision B.

F. OSDF Pre-design and Area 1, Phase II Pre-design Reports, latest revision available during bid period.

G. State of Ohio, Department of Natural Resources (ODNR): Rainwater and Land Development, Ohio's Standard for Storm Water Management, Land Development, and Urban Stream Protection - 1996.

H. Occupational Safety and Health Administration, Code of Federal Regulations - 49 CFR Parts 171 through 173, latest revision.

I. Fernald Environmental Management Project Plan PL-2194, Spill Prevention Control and Countermeasure (SPCC) Plan, September 1996, Revision 3.

J. Fernald Environmental Management Project Procedure RP-00100, Identification and Movement of Radioactive Material, May 1996, Revision 2.

K. Fernald Environmental Management Project (FEMP) Procedure PT-0007 Packaging Low Level Waste for Off-Site Shipment, August 1997, Revision 3.

L. EPA SW 846 Method 9095 Paint Filter Test.

M. Technical Reference Document - As-Built Drawings of the Structures in the Sewage Treatment Plant (STP) Area.

1.5 SUBMITTALS

A. Provide submittals in accordance with the requirements of Section 01011.

B. Excavation Work Plan: Submit to the Construction Manager within 20 calendar days from the Notice to Proceed for review and approval. The Excavation Work Plan shall include, as a minimum, the following:

1. Excavation, loading, hauling, and unloading methods and equipment, by size and type, for the impacted materials including unclassified impacted materials, Above WAC Material, stabilized lead contaminated soil, temporary stockpiles, debris, special material, and sediment. Include methods for segregating category 2, 3, and 4 impacted material specified in the Impacted Material Placement Plan during excavation and size reduction methods to meet the waste acceptance criteria (WAC) in the Impacted Material Placement Plan are met.
2. Technical approach for the coordination and implementation of the excavation related activities including submittals, surveying, fencing, tree and stump grinding and removal, loading requirements, equipment wash, haul road maintenance, material identification and documentation, supplemental excavation during pre-certification and certification, seeding,

stabilization of exposed excavated areas and dust control.

3. Integrated Schedule for impacted material excavation with Project Construction Schedule as specified in Part 6, for the excavation, including loading, hauling and unloading, and excavation related activities showing sequence, duration, critical activities, resources for each activity, number of crews and crew size, and start and completion date of each activity.
4. Environmental Health and Safety, and Training requirements for the excavation, loading, hauling and unloading including a plan for coordinating personnel and equipment in the excavation areas.
5. Methods for excavation, separation, and packaging of Presumed Asbestos Containing Materials (PACM) in accordance with Section 02210.
6. Methods for the excavation, management, loading, segregation, transfer, and staging of special material, Above WAC Material, and stabilized lead contaminated soil.
7. Methods for in situ treatment, and disposition of stabilized lead contaminated soil to the OSDF in accordance with Section 02211.
8. Loading, hauling and unloading methods for the Above WAC impacted materials to the OU-1 Stockpile and to the OSDF, including:
   a. Inclement weather operations.
   b. Spreading, grading, and compaction.
   c. Maintenance of surface conditions and drainage.
   d. Temporary shutdown and work stoppage.
   e. Methods to prevent haul equipment tires from coming in contact with Above WAC Material.
9. Loading, hauling, and unloading methods for impacted materials to the OSDF.
10. Location, sequencing, and construction of interim working stockpiles, if necessary.
11. Sequencing of construction of interceptor ditches.
12. Methods for complying with the FEMP Plan PL-2194 for spill prevention, control, and countermeasures.

1.6 EXISTING CONDITIONS

A. Prior to the start of excavation of the impacted material, examine the existing conditions as specified in Section 02050.

1.7 HEALTH AND SAFETY REQUIREMENTS

A. Environmental Health, Safety, and Training requirements shall be as specified in Part 8 of the Contract Documents.

1.8 DEFINITIONS

A. Impacted Material: Impacted material is defined as soil and debris with contaminant levels above the established Final Remediation Levels (FRLs).

B. Unclassified Impacted Material: Unclassified impacted material is defined as impacted material encountered during excavation, regardless of type, character, composition, and condition thereof, not otherwise specified in this Section. Categories of unclassified impacted material shall be as specified in the Impacted Material Placement Plan for the On-Site Disposal Facility (OSDF). Unclassified impacted material also includes debris encountered during excavation.

C. Debris: Debris consists of impacted material such as construction materials, concrete, asphalt, steel rebar, non-friable PACM and other materials not defined as a Special Material. Criteria for debris shall be as specified in the Impacted Materials Placement Plan and Waste Acceptance Criteria Attainment Plan for OSDF.

D. Lead Contaminated Soil: Soil with lead concentrations above the FRL for lead (400 parts per million [ppm]). This material shall be treated in-situ, in accordance with Section 02211, such that testing by the Toxicity Characteristic Leaching Procedure (TCLP) analysis demonstrates that the material is not characteristically hazardous. Soil with lead

concentrations between 200 ppm and 400 ppm will be excavated and used as borrow material for the OSDF.

E. Above Waste Acceptance Criteria (WAC) Material: Soil, soil mixed with debris, debris, or soil-like impacted material with total uranium concentrations above the OSDF total uranium WAC (1030 milligrams/kilograms [mg/kg]) or any other material that does not meet the OSDF WAC.

F. Above WAC Pipe: Above WAC pipe is defined as pipe with visible material that clings to the interior that exceeds the OSDF WAC.

G. Special Material: Impacted material which requires special handling shall be as listed below:

1. Friable PACM, as specified in Section 02210;
2. Nonpressurized in-tact containers, including drums, boxes, cans;
3. Pressurized containers;
4. Pumps and piping;
5. Non-soil residues, including green salt, black oxide, orange oxide, sump cake;
6. Transformers and electrical equipment;
7. Lead acid batteries;
8. Uranium metal, including derbies, ingots and irregularly shaped scrap;
9. Medical/infectious waste;
10. Tires;
11. Miscellaneous debris, including oil and air filters, personal protective equipment (PPE), radiators, cables, wires, tools, heavy equipment, office materials and documents, and lead flashing.
12. Acid brick.

H. Sediment: Material accumulated in the sedimentation basin, conveyance channel, diversion ditches, erosion and sediment control measures. Sediment will be managed as non-impacted material, as defined in Section 02200, unless otherwise directed by the Construction Manager.

PART 2 PRODUCTS

2.1 MATERIALS

A. Construction Manager will furnish metal boxes, lids, and fastening hardware for Above WAC Sludge Drying Bed Material. Each box shall be approximately 4 by 4 by 7 foot and weight approximately 1,100 pounds.

B. Construction Manager shall furnish materials, equipment, and personnel for radiological characterization and monitoring of the impacted material.

C. Aggregate base shall meet the requirements specified in Section 02206.

D. Geotextile, see Section 02270.

E. Rope fence shall be nylon, 3/8-inch diameter per Section 02100 (colors to be determined).

F. Signs and sign posts for the radiological control areas and certified areas shall be furnished and installed by the Construction Manager.

2.2 Equipment

A. Provide equipment of size and type to excavate, load, haul, and unload impacted material to meet the Contract requirements.

B. Equipment used to haul impacted material over the existing Borrow Area Haul Road as shown on the Construction Drawings shall be equal to or less than the gross vehicle weight, tire pressure and axle loading for a Caterpillar CAT D300E truck (gross vehicle weight of 106,700 pounds, tire pressure of 60 psi, and axle load of 37,400 pounds). Pavement width of the existing two way haul roads is 24 feet. Select equipment and equipment width to ensure safe operation on this road.

C. All excavation and haul equipment shall have enclosed cabs. Enclosed cab is defined as equipment cab isolated from outside environment (intact windows, doors, panels and floors surrounding driver with all windows and doors shut) which provides a barrier from intrusion of outside airborne particles. Any HVAC (heating, ventilating or air conditioning) units associated with the equipment cab must not provide a direct path for outside air to enter (air conditioner on air recirculate mode) or HEPA filter the air if pulling directly from outside the cab.

D. Provide water tank trucks, tank trucks for the crusting agent, portable tanks, pressure distributors, or other equipment designed to apply dust suppressant and crusting agent uniformly and in controlled quantities to variable surface widths to provide dust suppression as required in Part 6.

E. Provide stump grinder to meet the Contract requirements.

PART 3 EXECUTION

A. Perform work in accordance with the requirements in this part and the A1PII Implementation Plan.

B. Provide material identification and documentation in accordance with Section 02212.

3.1 GENERAL REQUIREMENTS

A. Establish site boundaries and ingress/egress in accordance with Section 02100.

B. Survey and layout all impacted material limits and grid in accordance with Section 02050 and as shown on the Construction Drawings.

C. Install and manage erosion and sediment control measures as shown on the Construction Drawings and in accordance with Section 02270.

D. Continuously observe excavations and immediately notify the Construction Manager when special material is encountered.

E. Dust control shall be as specified in Section 02100.

F. The Construction Manager and regulatory agencies may collect impacted material samples from the excavation, haul equipment and in the OSDF at any time during the project.

G. During excavation segregate Category 2 material larger than 12-inches to maximize volume of Category 1 material. Size reduce segregated Category 2 material to meet physical WAC specified in IMPP.

H. Location of interim working stockpiles shall be within the limits of the A1PII and as approved by the Construction Manager. Interim working stockpiles shall be removed within a maximum of thirty (30) calendar days.

I. Blasting, including use of explosives or explosive devices, is not permitted.

J. Water management shall be as specified in Section 02270.

K. Unexpected discovery of cultural resources: Upon the unexpected discovery of any historic, prehistoric, or archeological site, feature or object, immediately cease ground-disturbing activities of the find and contact the Construction Manager.

L. The following requirements shall apply to equipment for excavation, loading, hauling, and unloading:
   1. Equipment used for excavation, loading, hauling and unloading of the impacted material from the Area 1, Phase II shall be clearly marked. The Construction Manager will provide signs stating "Radioactive Material" in accordance with site procedure RP-0010.
   2. Equipment used during excavation, loading, hauling, and unloading of the impacted material and periods of non-use (evenings, weekends, holidays) shall be kept within the Sector being worked.
   3. Equipment used for excavation, loading, hauling, and unloading the impacted material shall not be permitted to leave the radiological control or lead control areas until equipment decontamination activities are completed by the Contractor and radiological survey of the equipment is performed by Construction Manager.
   4. Equipment cab shall remain closed and operators shall not be allowed out of the equipment in any posted contamination area without appropriate personal protective equipment (PPE) except in emergency situations.

M. Impacted material excavation and related activities shall be performed in accordance with the approved Excavation Work Plan.

N. Loading requirements:
   1. Haul equipment shall be loaded so as to minimize load shifting during transit.

2. Apply an EPA paint filter test for free liquid every five (5) truckloads, or a minimum of once per day during excavation activities, or if the moisture content of the excavated material appears to increase. Moisture content in the impacted material before loading shall be as specified in the IMPP.

O. Hauling requirements:

1. Haul equipment shall be washed at the Area 1, Phase II equipment wash facilities before entering the Borrow Area Haul Road for access to the OSDF, Woodchip Stockpile Area, or the OU-1 above WAC Stockpile, and before leaving the lead contamination, in accordance with Section 02850.
2. Haul equipment shall be decontaminated by Contractor before leaving the STP Area. The Construction Manager will perform radiological monitoring before equipment is released.
3. Haul equipment will be decontaminated and radiologically monitored by others before leaving the OSDF.
4. Provide dust control for the A1PII Haul Road on a continual basis.
5. Haul equipment traffic shall remain on the haul roads designated on the Construction Drawings. Equipment that enters these roads shall not be allowed to exit, without approval by the Construction Manager.
6. Tracked equipment shall be prohibited from hauling, operating, or tracking over or on the Borrow Area Haul Road, or the A1PII Haul Road.

P. Stump Grinding:

1. Grind stumps within A1PII to a minimum depth of 12 inches or to the bottom of the root-mass within 18 inches of the stump in all horizontal directions. Grind the wood chips in pieces generally smaller than 12 inches dimensions.
2. Excavate the ground stump wood chips with the soil and haul to the OSDF. The volume of organic material shall be less than 1/4 of the truckload

for hauling to the OSDF. Determination of the volume of organic material in the truckload shall be by visual observation by the Construction Manager.

Q. All abandoned utility lines indicated on the Construction Drawings shall be excavated. All lines shall be drained of liquid prior to removal. To the extent possible, drained liquids shall be prevented from spilling onto surrounding bedding and soil using drain pans, buckets, pipes/hoses inserted into the line to faciliate removal of the liquid, or other method approved by Construction Manager. Soil and bedding in trenches impacted by contaminated liquids shall be removed.

R. Above WAC pipe shall handled as Special Material, as specified in this Section. Should bedding and soil material surrounding the pipe be Above WAC, as determined by the Construction Manager, the material shall be segregated, hauled and placed in the OU-1 Stockpile.

S. At-and-Below Grade Structures: Remove, handle, process, haul, and unload At-and Below-Grade structures in accordance with Section 03316.

T. Perform stabilization of the excavated areas using crusting agent or temporary seeding in accordance with Sections 02270 and 02900, respectively.

U. Tolerances for excavation depths as shown on the Construction Drawings shall be ±3 inches. Tolerances for excavation of impacted surface soil (i.e., excavation depth less than six (6) inches) shall be ±2 inches.

V. If Contractor is unable to excavate within the limits of a planned excavation, notify the Construction Manager and unless otherwise directed, move to the next sequenced excavation. Movement between excavation areas shall be at no additional cost to FDF.

W. Special Material Transfer Area shall be constructed with aggregate base. Compaction requirements for aggregate material shall be in accordance with Section 02206. Special Material Transfer Area shall be as shown on the Construction Drawings.

3.2 UNCLASSIFIED IMPACTED MATERIAL EXCAVATION

A. Excavation of the unclassified impacted materials in the STP Area shall proceed by excavating a 2-foot ±3-inch surface lift followed by monitoring of the surface area by Construction Manager. Thinner lift thicknesses shall be approved by the Construction Manager. After excavation of the surface material, excavate all underground pipelines and underground utilities within the STP Area boundary. Construction Manager will monitor the excavations and confirm material disposition and depth of excavation. Upon notification by the Construction Manager, the excavation shall proceed using standard excavation techniques to the lines and grades shown on the drawings. At the Contractor's option, the deep excavation may proceed to within 1 to 1.5 feet of the final grade with the remainder incrementally excavated to final grade. Contractor shall refer to the Technical Reference Document for information on the STP Area. In no case will the Contractor be paid for over excavation without written approval from the Construction Manager.

B. Excavation of influent and effluent pipelines outside the STP Area shall proceed by removing 6 inches of surface soils, followed by monitoring by Construction Manager. Then excavate trench material to within 2-1/2 feet ±3 inches of the top of the pipeline as shown on Construction Drawings and place in a soil stockpile as directed by the Construction Manager. Construction

Manager will obtain grab samples of the material during excavation for potential reuse. The remaining material shall be excavated to the lines and grades shown on the Construction Drawings and the material disposed in the OSDF; unless otherwise directed by the Construction Manager. The Contractor shall provide OSHA approved equipment (e.g., shields, cages, and/or catwalks) for trench construction, as required by Construction Manager, to allow Construction Manager personnel to enter the trench to obtain samples from the trench sides and floor.

C. Excavation of other pipelines and electric utilities shall proceed by removing 6 inches of surface soils, followed by monitoring by the Construction Manager. The remaining material shall be excavated to the lines and grades shown on the drawings with the soil material placed in a soil stockpile as directed by the Construction Manager for future use as backfill. Debris shall be processed (i.e., sized) to meet the OSDF WAC and disposed into the OSDF.

D. If unexpected Above WAC or Special Materials, are encountered, stop excavation, notify the Construction Manager, and move the excavation operation to another location, as directed by the Construction Manager.

3.3 LEAD CONTAMINATED SOIL EXCAVATION

A. In-situ treat and excavate the lead contaminated soil in accordance with Section 02211.

B. Survey and stake the limits of stabilized lead contaminated soil excavation in accordance with Section 02050 and as shown on the Construction Drawings.

C. Construction Manager will sample and test the stabilized lead-contaminated soil to demonstrate that treatment objectives have been achieved.

D. Upon approval of Construction Manager, excavate the stabilized material to the limits shown on the Construction Drawings.

E. Haul and unload stabilized material at OSDF.

F. Construction Manager will perform confirmatory sampling of the lead contaminated soil area when excavation is complete. Contractor shall remove all construction equipment to another location during sampling and while awaiting the results of the sampling, at no additional cost.

G. Perform additional excavation within the lead contaminated soil area as directed by the Construction Manager and as specified in this Section.

H. Grade the excavated area to drain and seed in accordance with Section 02900.

3.4 ABOVE WAC MATERIAL EXCAVATION

A. Survey and stake limits of Above WAC sludge in Sludge Drying Beds in accordance with Section 02050.

B. Visually identify and excavate Above WAC sludge in the Sludge Drying Beds. Depth is anticipated to range from zero (0) to six (6) inches.

C. Upon completion of excavation, Construction Manager will monitor the impacted area to verify that all Above WAC Material has been removed.

D. Excavate additional materials as directed by the Construction Manager.

E. Excavation and haul equipment and containers shall remain outside of the Above WAC Area at all times.

F. Deliver metal containers provided by the Construction Manager with lids fourteen (14) days prior to the start of excavation. Load the Above WAC Material into white metal boxes and haul to the Special Material Transfer Area. The Construction Manager will sample the material prior to the Contractor fastening the container lids and hauling to the Special Material Transfer Area. The containers shall be loaded and fastened per FEMP PT-0007.

G. Loaded containers shall not exceed 9000 pounds in gross weight. Contractor shall estimate weight using volume and density. The sludge is expected to have bulk unit weights ranging from 90 to 125 pounds per cubic foot (pcf).

H. Decontaminate containers before hauling to the Special Material Transfer Area.

3.5 SPECIAL MATERIAL EXCAVATION

A. Special Materials identified during excavation shall be excavated, segregated, managed, loaded, transferred and staged at the Special Materials Transfer Area as directed by the Construction Manager.

B. The Construction Manager will be responsible for final disposition of the Special Materials.

C. Special Materials Transfer Area shall be as shown on the Construction Drawings.

D. PACM encountered during excavation shall be managed in accordance with Section 02210.

E. Construction Manager will furnish containers necessary for handling staging, transferring, and disposal of Special Materials, except for PACM.

3.6 REMOVAL OF SEDIMENT

A. Construction Manager will sample and test sediment and debris in ditches and at erosion and sediment control measures prior to removal.

B. Remove accumulated sediment and debris from existing ditches and erosion and sediment control measures as directed by the Construction Manager.

C. Haul removed sediment and debris to the OSDF as non-impacted material unless otherwise directed by the Construction Manager.

3.7 SUPPLEMENTAL EXCAVATION, PRE-CERTIFICATION AND CERTIFICATION

A. After excavation is completed in a Sector to the limits shown on the Construction Drawings, the Contractor shall survey the excavated area in accordance with Section 02050. After survey, the Construction Manager will perform monitoring to pre-certify the areas as having attained FRLs. The Construction Manager will take up to ten (10) calendar days to perform monitoring of an area. If the monitoring indicates an area has not attained FRLs, continue additional excavation in 1-foot lifts as directed by the Construction Manager until FRLs have been attained. Pre-certification monitoring by the Construction Manager will follow each lift of the supplemental excavation.

B. After pre-certification has been achieved, install rope fencing along the perimeter of the pre-certified area as directed by the Construction Manager and maintain erosion controls and drainage in the area. The Construction Manager will install sign posts and signs.

C. The Construction Manager will perform certification sampling and analysis after pre-certification. Receipt of sampling data may take 120 calendar days. After receipt of certification sampling laboratory data, the

Construction Manager will determine if areas of additional supplemental excavation are required in the excavation area. These areas shall be excavated as directed by the Construction Manager.

D. Supplemental excavation shall be considered as Unclassified Impacted Material excavation unless otherwise directed by the Construction Manager.

3.8 BACKFILLING

A. Backfilling shall be done in accordance with Section 02206.

END OF SECTION

SECTION 02206
GENERAL EARTHWORK, BACKFILLING AND INTERIM GRADING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sampling and testing of compaction.

B. Site grading.

C. Backfilling and compaction.

D. Pipe bedding and trench backfilling.

E. Construction of containment berm.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 01012 - Schedule of Drawings.

D. Section 02050 - Surveying.

E. Section 02100 - Site Preparation.

F. Section 02205 - Impacted Material Excavation and Handling.

G. Section 02270 - Erosion and Sediment Control.

I. Section 02900 - Soil Preparation and Seeding.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. State of Ohio, Department of Transportation (ODOT):

1. Construction and Material Specifications, January 1, 1997. Except as supplemented or otherwise modified herein and/or shown on the construction drawings, the entire work under this section shall be in compliance with the provisions of ODOT.

B. American Society for Testing and Materials (ASTM):

1.	ASTM C136-96 (Rev. A)	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2.	ASTM D422-63	Standard Test Method for Particle-Size Analysis of Soils.
3.	ASTM D698-91	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft [600 kN-m/m]).
4.	ASTM D2487-93	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
5.	ASTM D2922-96	Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).
6.	ASTM D4318-95 (Rev. A)	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

C. Occupational Safety and Health Administration, Code of Federal Regulations (CFR):

1.	29 CFR 1926.650	Subpart P - Excavations, latest revision.

1.5 SYSTEM DESCRIPTION

A. This section involves general earthwork, backfilling and compaction relating to the containment berm, roads, pads, drainage features and excavated areas, and the insulation and encasement of the portion of the existing 24" groundwater line (GW-24") which is exposed during installation of storm culverts.

1.6 SUBMITTALS

A. Provide submittals as required in Section 01011.

B. Material Source: Submit name of imported materials suppliers if required. Change of source requires approval by Construction Manager.

C. Submit name and address of soil testing laboratory for Construction Manager approval. Provide Construction Manager with copies of all lab/field soil tests performed by soil testing laboratory.

D. Submit the proposed Flowable Fill mix design along with the name and address of the batch plant to the Construction Manager for approval. The mix design shall include results from at least three strength tests.

1.7 QUALITY ASSURANCE

A. The Contractor shall arrange and pay for the services of a qualified, independent soil testing laboratory. The qualifications of the laboratory must be submitted to the Construction Manager and approved in writing prior to initiation of excavation or earthwork activities.

B. A qualified technician shall be employed by the Contractor and shall prepare at least three samples from each day's placement of Flowable Fill. Samples shall be tested in an off-site laboratory for compressive strength in accordance with ASTM C 31 and ASTM C 39.

PART 2 PRODUCTS

2.1 MATERIALS

A. Every effort shall be made to reuse surplus materials generated by the project, material from the Area 1, Phase II (A1PII) Borrow Area designated on the Construction Drawings or other on-site borrow areas before importing material from off site. Use of any off-site materials must be approved in writing by Construction Manager prior to bringing any material onto the FEMP Site. All reused and imported material shall be tested by the Construction Manager and meet FRLs and geotechnical requirements.

B. Subsoil Type S1: Excavated and reused or imported material; graded; free of lumps larger than 3 inches, rocks larger than 2 inches, and debris; conforming to ASTM D2487 Group Symbol CL, ML, SC.

C. Subsoil Type S2: Excavated and reused or imported material; graded, free of lumps larger than 3 inches, rocks larger than 5 inches, and debris; conforming to ASTM D2487 Group Symbol CL, CH, SC.

D. Coarse Aggregate Type A2: Conforming to ODOT Item 304 - Aggregate Base.

1. The aggregate shall be crushed carbonate, crushed gravel, or other types of suitable materials meeting the requirement of this item, including the following gradation requirements (excluding crushed air-cooled slag, granulated slag, or a mixture of crushed and granulated slag):

Sieve Size	Percent Passing
2 inches	100
1 inch	70-100
3/4 inch	50-90
No. 4	30-60
No. 30	9-33
No. 200	0-13

2. Physical Properties
   a. Percentage of wear, Los Angeles test, maximum (stone or gravel) 50
   b. Unit weight, compacted, pounds minimum (slag) 65
   c. Loss, sodium sulfate soundness test, percent maximum 15
   d. Percentage of fractured pieces, minimum 90
   e. Deleterious substances shall not exceed the following:
      Shale, shaly material, and chert which disintegrates in five (5) cycles of soundness test, percent by weight 5
3. The portion of aggregate passing the No. 4 sieve shall have a maximum liquid limit of 25 percent and a maximum plasticity index of 6 (PER ASTM D4318).

E. Fine Aggregate Type A3: Sand - natural river or bank sand; washed; free of silt, clay, loam, friable or

soluble materials, and organic matter; graded in accordance with ASTM C136 and D2487; within the following limits:

Sieve Size	Percent Passing
No. 4	70-100
No. 50	20-90
No. 200	0-40

F. Geotextile: Geotextile fabric shall be in accordance with Section 02270.

G. Flowable Fill

1. A blend of Portland cement, fly ash, sand and water. FLowable fill shall be readily flowable and shall obtain a nominal 28-day compressive strength of 100 psi with a minimum of 75 psi.

2. Proportions shall be as required to meet strength requirements while achieving essentially a self-leveling consistency and shall be the responsibility of the Contractor.

H. Pipe Insulation: Pipe insulation shall be in accordance with Section 02999.

2.2 EQUIPMENT

A. Provide equipment of size and type to haul, unload, and compact material to meet contract requirements.

PART 3 EXECUTION

3.1 PREPARATION

A. Survey and layout all work in accordance with Section 02050.

B. Identify flag, maintain and protect existing utilities and features to remain in the construction area.

3.2 SUBGRADE/PREPARATION

A. Prepare subgrade as follows:
   1. Compact exposed subgrade to same density specified for subsequent backfill materials. When existing ground surface has a density of less than the density specified, break up the ground surface, pulverize, adjust moisture content to limits specified for backfill and compact to specified density.
   2. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with Type S1 or S2 fill and compact to density equal to or greater than requirements for subsequent fill material.

B. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Unsatisfactory subgrade:
   1. Where unsatisfactory subsurface conditions in an area of backfill are observed, excavate unsatisfactory material to satisfactory subgrade as approved by Construction Manager.
   2. Backfill with fill material required for specific area. Compact to density required for the area.

D. Remove visible rocks larger than 3 inches from the Conveyance Channel and Sediment Basin.

E. Remove visible sandy soil from Sediment Basin to a depth of one (1) foot, backfill with Type S1, CL material, and compact to specified density.

F. Disc Sediment Basin floor and sides and Tank Farm Area to minimum depth of six (6) inches and compact as specified in this Section.

3.3 BACKFILL AND COMPACTION

A. General

1. Place and compact fill materials in continuous level layers not exceeding 8 inches loose depth in areas where compaction is do be performed using hard operated equipment, place fill material in loose lifts with thickness not exceeding 5 inches.
2. Maintain optimum moisture content as determined by ASTM D698 (within 3 percent of optimum) of backfill materials to attain required compaction density. If necessary, moisture condition fill material. Use water truck and spray nozzle for wetting. During wetting or drying, regularly disc, rake, or otherwise mix the material to thoroughly blend the moisture throughout the lift. Use discing, raking, or other appropriate methods to dry the materials required.
3. Do not place frozen fill nor place fill material on frozen or saturated material.
4. Do not compact fill material at temperatures below 32° F, unless otherwise authorized in writing by the Construction Manager.
5. Do not place fill during periods of precipitation. Placement may occur during periods of misting or drizzle, but only if authorized by the Construction Manager.
6. Grade excavation areas to drain, as indicated on drawings.

B. Backfilling of New Utility Trenches
1. Pipe bedding for remediation-generated water transfer line shall be Type A3 material compacted in layers not exceeding 4 inches loose depth.
2. Pipe bedding for culverts shall be type A2 material compacted in layers not exceeding 8 inches loose depth.
3. Fill Type S1, above bedding. Layer thickness shall not exceed 8 inches loose depth.
4. For "By Method" compaction, each layer of pipe bedding and backfill shall be compacted by five passes of compaction equipment. Each pass shall overlap each preceding pass by at least 2 inches. Compaction equipment shall be vibratory and impart at least 2,000 foot-pounds of impacted energy with

a frequency of 500 bpm, which is similar to a medium size excavator mounted tamping plate/ram.

5. Standard Proctor Test shall be used for remediation generated water transfer line, sections under pavement, sediment basin principle spillway culverts and culverts under Sewage Treatment Plant (STP) Access Road at inlet to sediment basin.

C. Backfilling in Impacted Material Areas

1. Remove impacted material in accordance with Section 02205.
2. Backfill area with fill type S1 of S2 (excluding group symbol CH) to excavation contours and elevations as shown on the Construction Drawings.
3. Place and compact backfill in accordance with this Section.
4. Perform grading to maintain site drainage. No water shall be permitted to accumulate in excavation areas. Grading shall be performed to allow drainage to permanent ditches.

D. Pipe Insulation

1. Install pipe insulation around the exposed portions of the existing groundwater line in accordance with Section 02999.

E. Flowable Fill Encasement

1. Verify that the bedding and backfill around the five storm culverts is in place and compacted.
2. Verify that the pipe insulation has been installed and is in good condition.
3. Place flowable fill around existing groundwater line (GW-24") as shown on the Construction Drawings. Flowable fill shall be placed by chute directly into the trench to be filled while truck drum is rotating/agitating.

F. Backfill of Removed Utilities

1. Remove utilities in accordance with Section 02205.
2 Backfill trenches with fill type S1 or S2.
3. Place backfill in accordance with this Section.

4. Do not backfill any trenches until approved by Construction Manager.

G. Containment Berm
1. Berm shall be constructed as shown on Construction Drawings and as specified in this Section.
2. Berm shall be constructed using type S1 or S2 material.

H. Stabilization: See Section 02900.

I. Dust Control: See Section 02100.

3.3 FIELD QUALITY ASSURANCE

A. Compaction testing will be in accordance with this Section.

B. Nuclear density (ASTM D2922) equipment will be calibrated in accordance with the manufacturer's requirement. Documentation of this calibration will be provided to Construction Manager.

C. Grain size analysis shall be performed in accordance with ASTM D422.

D. Moisture-density curves will be determined in accordance with ASTM D698 (Standard Proctor).

E. Soil classification shall be in accordance with ASTM D2487.

F. Pipe bedding can be compacted "By Method" or tested.

G. If compaction test, density and/or moisture tests indicate that work does not meet specified requirements, remove work and replace or recompact to specified requirements. If visual inspection by Contractor or Construction Manager indicates that work has not been performed as specified, repeat procedure.

H. Testing:

1. Frequency of in-place density and moisture testing shall be whichever of the following requires the greatest number of tests:
   a. Once each day of work filling/backfilling.
   b. Once every layer of fill.
   c. Once every 500 cubic yards of fill.
   d. Every 2,000 square feet in STP and Sediment Basin.
   e. Once every 200 feet of trench.
   f. Continuous visual inspection will be necessary for compaction of bedding in trenches, if "By Method" compaction is used.
2. Location of tests shall be random, as determined using random number generation techniques and approved by the Construction Manager.

I. The Contractor shall notify Construction Manager of activities that will require testing/inspection prior to the start of such activities.

J. Minimum Compaction Requirements:

Location	Required Compaction
Within STP Excavation	95 percent Standard Proctor
Sediment Basin and Tank Area	90 percent Standard Proctor
Containment Berm	95 percent Standard Proctor
Under all Pavement Replacement Subsoil Fill Type A2	 95 percent Standard Proctor 95 percent Standard Proctor
All other fill, including removed utility trenches (Fill Type S1)	90 percent Standard Proctor
Topsoil	By Method
Trenches (for proposed utilities)	By Method (See Note below) or 95 percent Standard Proctor

Standard Proctor - ASTM D698.

Note: If "By Method" compaction is used and performed in accordance with Article 3.3 in trench, testing of bedding is not required.

3.4 TOLERANCES

A. Grading and Filling: ±1 inch of indicated finish subgrade at structures and pavements. Other areas graded to drain at ±3 inches.

B. Finish Grade: ±3 inches of required elevation or plane.

3.5 PROTECTION

A. Reshape and recompact fills subjected to vehicular traffic to final grade and to compaction requirements given in Article 3.3.

B. Prevent contact between and/or mixing of impacted material and non-impacted material.

END OF SECTION

SECTION 02210
PRESUMED ASBESTOS CONTAINING MATERIALS (PACM)

PART 1 GENERAL

1.1 SECTION INCLUDES

This section includes the requirements for handling, packaging, loading, hauling and unloading of Presumed Asbestos Containing Materials (PACM). The excavation, handling, packaging, loading and hauling activities at and from the work areas are considered "disturbance of an inactive asbestos waste disposal site," "renovation of facility components" and "asbestos waste handling," while the unloading activities at the On Site Disposal Facility (OSDF) are considered "active asbestos waste disposal" — rather than "asbestos hazard abatement" — as those terms are used in the referenced administrative code and federal regulations.

1.2 RELATED SECTIONS AND PLANS

A. Section 02205 - Impacted Material Excavation and Handling.

B. Section 02212 - Materials Identification and Documentation.

C. Part 6 - Statement of Work.

D. Part 8 - Environmental Health and Safety, and Training Requirements.

E. Impacted Material Placement Plan, On Site Disposal Facility, October 1997, Revision I.

1.3 REFERENCES

A. Ohio Administrative Code (OAC), Chapter 3745-20, Asbestos Emission Control.

B. Title 29, Code of Federal Regulations (CFR), Part 1926.1101, Asbestos.

C. Title 40, Code of Federal Regulations (CFR), Part 763, Asbestos Containing Material in Schools.

D. Waste Acceptance Criteria Attainment Plan for the On Site Disposal Facility, August 1997, Revision B.

1.4 HEALTH AND SAFETY REQUIREMENTS

A. Environmental Health and Safety, and Training requirements shall be as specified in Part 8 of the Contract Documents.

1.5 SUBMITTALS

A. Submit a PACM Handling Plan, in compliance with all applicable federal (CFR) and state (OAC) requirements, within 10 calendar days from the Notice to Proceed for approval by the Construction Manager. The plan shall describe the following as a minimum:

1. Method to be used to ensure its (inclusive of Contractor) employees are informed of the presence of PACM in the project work area.
2. Method(s) to be used to establish a restricted area adequate to deter the entry of unauthorized personnel within 100 feet of the PACM work areas.
3. Personal protective equipment to be worn by employees.
4. Work practices to be observed by employees.
5. Methods to be used to handle and package friable PACM and to ensure no visible asbestos emissions during handling, loading, hauling and unloading.
6. Methods to handle non-friable PACM to minimize the potential for non-friable PACM to become friable and to ensure no visible asbestos emissions during handling, loading, hauling and unloading.
7. Methods to be used if PACM must be size-reduced to size criteria described in the Impacted Material Placement Plan.
8. The encapsulant and surfactant agents to be used.
9. Product data and technical information including application instructions and Material Safety Data Sheet (MSDS) for each material proposed for use.
10. Labeling methods.

11. Identification of the Contractor's "asbestos competent person" personnel.
12. State of Ohio certification for the Contractor's personnel as required by law and administrative code.
13. State of Ohio certificates and licenses for the Contractor as required by law and administrative code.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sheet wrapping materials for PACM shall be either:
1. Clear polyethylene a minimum of 12 mils thick if used in a single layer, or a minimum of 6 mils thick if used in a double layer;
2. Polypropylene woven fabric a minimum of 10 mils thick.

B. Disposal bags for PACM shall be clear polyethylene a minimum of 6 mils thick.

C. Materials to be used as encapsulants and surfactants shall be in original, new, and unopened packages and containers bearing manufacturer's name, label, and the following information:
1. Name of material.
2. Manufacturer's stock number and date of manufacture.
3. Manufacturer's name.
4. Thinning instructions.
5. Application instructions.

D. Surfactant (wetting agent) shall as specified by the following approved manufacturers:
1. Childers CP-225 CHIL-SORB.
2. Certech.
3. Expert Environmental Products.
4. International Protective Coatings Corp.
5. Or approved equal.

E. Encapsulants shall be as specified by the following approved manufacturers:
   1. Childers - CP-240 CHIL-LOCK.
   2. Certified Technologies - Certane 2050.
   3. Expert Environmental Products - EPPCO #1.
   4. International Protective Coatings - Serpiloc.
   5. Or approved equal.

F. Other materials required by the Contractor for handling and packaging of friable PACM.

PART 3 EXECUTION

3.1 APPLICATION

A. FDF has provided the necessary notification of these activities required by OAC 3745-20. The OSDF is an active asbestos waste disposal site in accordance with OAC 3745-20-06.

B. The Contractor shall be responsible for:
   1. Adherence and compliance to work practices and procedures set forth in applicable federal regulations (CFR) and state codes (OAC).
   2. Ensuring its (inclusive of Contractor) employees are informed of the presence of PACM in the project work area(s) in accordance with 29 CFR 1926.1101(d) and OAC 3745-20-06(B)(4).
   3. Establishing a restricted area adequate to deter the entry of unauthorized personnel within 100 feet of the PACM work areas in accordance with OAC 3745-20-06(B)(4).
   4. Obtaining required training.
   5. Conforming with Part 8 for training requirements.
   6. Dust control in accordance with Part 6 and the Dust Control Plan.
   7. Using wet methods and other work practices and engineering controls to prevent creation of visible asbestos emissions during handling of PACM.
   8. Personal air monitoring in accordance with 29 CFR 1926.1101(f) including sampling necessary to complete initial exposure assessment.

C. The Contractor shall ensure an asbestos competent person is on-site anytime PACM is being disturbed, excavated, handled, loaded, hauled, or unloaded.

D. Contractor shall use the following project specific handling methods in accordance with the approved PACM Handling Plan:

1. During excavation of the underground fuel gas line, electric concrete duct bank or other facility components, the Contractor's asbestos competent person shall walk the work area and visibly identify PACM as friable or non-friable.
2. Non-friable PACM, which is determined not to have the potential to become friable, shall be considered as unclassified impacted material and shall be excavated, loaded, hauled and unloaded as specified in Section 02205. Care shall be taken so that the non-friable PACM does not break or crumble during handling. In the event that it breaks or crumbles during handling, encapsulate the exposed surfaces.
3. PACM identified as friable shall be either adequately wetted with water or amended water (water mixed with surfactant), or encapsulated. "Adequately wetted" means sufficiently penetrated with liquid to prevent the release of particulates; if visible emissions are observed coming from the asbestos-containing material, the material has not been adequately wetted.
4. Facility components coated or covered with friable PACM shall be removed as units or sections to the maximum extent possible. Maximum dimensions are restricted by the OSDF Waste Acceptance Criteria (WAC) physical size criteria in accordance with the Impacted Material Placement Plan:
   (a) Maximum length is 10 (±1) ft.
   (b) Piping 12 inches diameter or greater shall be axially or radially split.
5. Surfactants or encapsulants shall be applied during sizing of any large pieces of friable PACM to meet the OSDF WAC physical size criteria.
6. Friable PACM components removed as units or sections and meeting the OSDF WAC physical size

criteria shall be wrapped in sheeting, secured with duct tape, and labeled in accordance with OAC 3745-20-05(C)(1). Multiple pieces, units or sections may be grouped prior to wrapping, as long as the grouping meets the OSDF WAC physical size criteria.

7. Pieces of friable PACM not conducive to wrapping shall be bagged in a polyethylene bag, sealed, bagged in a second polyethylene bag, sealed, and labeled in accordance with OAC 3745-20-05(C)(1).
8. Friable PACM with sharp-edged components (e.g., nails, screws, metal lath, tin sheeting) capable of tearing the polyethylene bags or sheeting shall be handled in either of the following ways:
   (a) Remove, or pad/wrap and secure, the sharp-edged components in a manner to prevent tearing of the polyethylene, then wrap or bag in accordance with the respective preceding entries.
   (b) Place into Contractor-supplied, polyethylene-lined containers (i.e., fiberboard boxes or drums). Metal containers are not allowed. Container size is subject to the Impacted Material Placement Plan for Category 5. The polyethylene liner shall be sealed prior to sealing the container. The container shall be labeled in accordance with OAC 3745-20-05(C)(1).
9. Wrapped, bagged, or containerized friable PACM shall be segregated from other excavated material and accumulated at the Special Materials Transfer Area. When a sufficient quantity for a segregated load is accumulated, it shall be loaded and hauled to the OSDF. Loads shall be prepared and secured to prevent any visible asbestos emissions, load loss, and spillage or leakage of liquids.
10. No PACM shall be left exposed at the surface of the excavation at the end of the work day.

E. Wrapped, bagged, or containerized friable PACM shall be unloaded in the OSDF as Category 5 material in accordance with the Impacted Material Placement Plan which presents additional requirements.

F. Each work day during disturbance, excavation, handling, hauling, loading, or unloading of PACM waste, the Contractor's asbestos competent person shall conduct a daily inspection of the PACM waste handling work area(s) and adjacent areas. If there is visual evidence of asbestos contamination (e.g., spills of PACM waste) outside the demarcated PACM waste handling work area(s), the Contractor shall take immediate action to abate the hazard. The incident shall be reported immediately to the Construction Manager.

END OF SECTION

SECTION 02211
LEAD CONTAMINATED SOIL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for bench scale treatability study.

B. In-situ stabilization of lead contaminated soil.

1.2 RELATED SECTIONS AND PLANS

A. Section 02205 - Impacted Material Excavation and Handling.

B. Section 02212 - Materials Identification and Documentation.

C. Part 6 - Statement of Work.

D. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

A. Environmental Protection Agency (EPA)
   1. Toxicity Characteristic Leaching Procedure (TCLP) EPA SW846, Method 1311
   2. Paint Filter Liquid EPA SW846, Method 9095

B. Sitewide Excavation Plan, July 1997, Revision C.

C. Geotechnical Data and Evaluation Report for East and South Field Borrow Areas, June 1996, Revision 0.

D. Letter Report for Lead Delineation in the Area 1, Phase II Trap Range, November 1997, Revision B.

1.4 HEALTH AND SAFETY REQUIREMENTS

A. Environmental Health and Safety, and Training requirements shall be as specified in Part 8 of the Contract Documents.

1.5 SUBMITTALS

A. Submit a Conceptual Treatability Study Plan with the bid and a Treatability Study Work Plan (TSWP) within 10 calendar days from the Notice to Proceed for approval by the Construction Manager. The TSWP will serve as the guideline for performing all subsequent tasks during the treatability study and all treatability study tasks will be performed in accordance with the approved TSWP. Each plan shall include the following as a minimum with the Conceptual Plan providing preliminary direction and the Work Plan updating the Conceptual Plan to reflect revisions requested by the Construction Manager:

1. The goals of the treatability study and the procedures used to attain these goals.
2. All QA/QC procedures and examples of associated documentation.
3. Detailed description of the testing scheme to be utilized (i.e., outline range of additives and loading rates that will be tested and the samples that will be analyzed).
4. Schedule for the treatability study phase.
5. Location for treatability study.

B. Submit a Conceptual Stabilization Plan with the bid and a Stabilization Work Plan within 30 calendar days of submission of the Treatability Study Report for approval by the Construction Manager. Each plan shall include the following, with the Conceptual Plan providing preliminary direction and the Work Plan updating and revising the Conceptual Plan based on the Treatability Study.

1. Type(s), including specifications, and amount of stabilizing agent(s) and/or admixture(s) to be

applied.

2. Method and number of applications of stabilizing agent(s) to the soil.
3. Method and number of applications of admixture(s) to the soil.
4. Methods(s) of mixing stabilizing agent(s) and/or admixture(s) with the soil.
5. Quality assurance and quality control procedures to be implemented to ensure that planned loading rates are achieved and that stabilizing agent(s) and/or admixture(s) are adequately mixed throughout the depth of lead-contaminated soil.

C. Submit a Treatability Study Report within 10 calendar days from the completion of the testing in accordance with the reporting procedures approved in the TSWP to the Construction Manager. The Treatability Study Report shall include the following:

1. The goals of the treatability study.
2. Initial waste characterization.
3. Testing performed during the study.
4. Equipment used during the study.
5. Observation made during the study.
6. Analytical results.
7. Discussion and interpretation of the results, including a comparison of the effectiveness of each treatment and the associated costs for each recommendation of the optimal mix.

Any additional information that is collected during the study that will support the remedial action should also be documented and included in the treatability study report

PART 2 PRODUCTS

2.1 MATERIALS

A. Specifications for stabilizing agent(s) and/or purchased admixture(s) to be provided by the Contractor in Conceptual Stabilization Report and Stabilization Report.

2.2 EQUIPMENT

A. Provide equipment of size and type to receive, store, handle, apply, and mix stabilizing agent(s) and/or admixture(s) to meet contract requirements.

PART 3 EXECUTION

3.1 TREATABILITY STUDY

A. The contractor will perform a treatability study in accordance with the TSWP to determine an efficient and cost-effective system for in situ stabilization of lead-contaminated surface soil. The contractor will examine a range of additives and loading rates to optimize the treatment that will be employed in the remediation phase. The contractor will perform the treatability study as follows:

1. The treatability study will be conducted at the bench-scale level at the contractor's facility. The contractor will not need a NRC license to perform the treatability study.
2. The contractor must obtain any applicable permits before starting the treatability study.
3. Site soils will be sampled by FDF personnel and shipped to the contractor's facility. The contractor will have the option of overseeing the sampling effort so that the proper amount of representative soils are obtained. Initial characterization of lead concentrations will be performed and the results submitted to the Construction Manager prior to the start of treatability testing to ensure that lead concentrations in the soil samples are representative of site conditions.

4. The goal of the treatability study is to determine the optimal, cost-effective stabilization mix. The optimal stabilization mix is defined as the lowest cost mix that achieves the goals listed below.
5. Successful mixes are defined as any mix resulting in a stabilized waste that leaches a lead concentration of less than 5 mg/L in the TCLP test and passes the Paint Filter Liquids test, indicating that the stabilized soil contains no free liquid.
6. The contractor will test a minimum of 3 stabilizing agents known to the contractor to be effective in stabilizing lead-contaminated soils. Agents to be considered include potassium-based, phosphate-based, sulfate-based, sulfide-based, and calcium-based agents.
7. As requested by the contractor, coal-fired boiler flyash and/or lime sludge from water softening available at the site can be used as an admixture.
8. Each stabilizing agent/admixture will be tested over a range of loading rates. A minimum of 3 loading rates will be tested for each additive considered in order to determine the optimal stabilization mix. The contractor will test any additional loading rates necessary to define the optimal mix.
9. The contractor will determine the reaction/cure time required before treated soils can be excavated.
10. QA/QC samples will be collected at a rate of 1 in 20 samples and analyzed as matrix spike/matrix spike duplicates (MS/MSD).

3.2 STABILIZATION

A. The contractor shall stabilize lead-contaminated soils in accordance with the Stabilization Work Plan to reduce the concentration of lead in the leachate during a TCLP test to less than 5 mg/L.

1. The area to be remediated is approximately 3.5 acres.
2. Stabilization shall be performed in situ to a minimum depth of 6 inches and to a minimum depth of 12 inches in one location within the lead-contaminated area that is approximately 0.5 acres.
3. Dust control shall be in accordance with part 6 and the Dust Control Plan.
4. The contractor shall obtain all applicable permits prior to starting the remedial action.
5. Once the soil has stabilized, based on the optimal cure time developed in the treatability study, the Construction Manager will collect and analyze samples to demonstrate that treatment objectives have been achieved.
6. If treatment objectives are not met, take additional actions necessary to obtain those objectives.
7. Once treatment objectives are met and upon approval of the Construction Manager, excavate, haul, and unload stabilized material in accordance with Section 02205.

END OF SECTION

SECTION 02212
MATERIAL IDENTIFICATION AND DOCUMENTATION

PART 1 GENERAL

1.1 SCOPE

This section includes the requirements for the impacted material identification and documentation to be performed by the Contractor. Materials handled but retained in a given Material Tracking Location (MTL) are not subject to these requirements.

1.2 RELATED SECTIONS

A. Section 02050 - Surveying.

B. Section 02205 - Impacted Material Excavation and Handling.

C. Part 6 - Statement of Work.

D. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

A. Impacted Material Placement Plan (IMPP), On Site Disposal Facility, August 1997, Revision H.

1.4 DEFINITIONS

A. Material Tracking Locations (MTLs) - The specific areas identified in this specification and as shown on the Construction Drawings; MTLs include:

MTL Number	MTL Description
CON-017	OU-1 Stockpile
A12-001	Sector 2
A12-002	Rerouted North Entrance Road
A12-003	Material Stockpile
A12-004	Sewage Treatment Plant
A12-005	Conveyance Channel
A12-006	Underground Utilities
A12-007	STP Access Road
A12-008	Trap Range
A12-009	Sediment Basin
A12-010	Borrow Area
A12-011	Special Material Transfer Area
A12-012	Material Stockpile Area
A12-013	Material Stockpile Area
A12-014	Material Stockpile Area
A12-015	Material Stockpile Area
A12-016	Sludge Drying Beds
A12-017	In Plant Transfer Line
SWU-008	Woodchip Stockpile Area

Additional MTLs may be added as the Area I, Phase II (A1PII) excavation progresses. These new MTLs will be identified by the Construction Manager and provided to the Contractor.

B. OSDF Manifest - Document the identity and source location (and associated analytical data) of the material hauled to the OSDF. See Attachment I.

C. Field Tracking Log (FTL) - Documents the source MTL, quantity, material profile/description, and destination MTL, of the material moved between MTLs (including Special Materials moved to the Special Material Transfer Area) by the Contractor. See Attachment II.

D. The following notes apply to the attachments to this Section:

Note 1. Contractor to provide information; Construction Manager to record on form.

Note 2. Contractor equipment operator signature required.

Note 3. All other boxes to be completed by Construction Manager.

1.5 SUBMITTALS

Submit for approval, within ten (10) calendar days from Notice to Proceed, the Material Identification and Documentation Work Plan. The plan shall include the following:

A. Methods for providing information for identification and documentation of material movement as specified in this Section.

B. A table which presents each piece of haul equipment, its haul capacity in cubic yards, and its assigned unique alpha-numeric identifier.

C. Identify all competent personnel who will be involved with material identification and documentation.

1.6 HEALTH AND SAFETY

Environmental Health and Safety, and Training requirements shall be as specified in Part 8 of the Contract Documents.

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide approximately 12-inch by 12-inch metallic identifier, two per piece of hauling equipment, showing unique alpha-numeric equipment identification.

B. OSDF manifest and FTL forms will be provided by Construction Manager.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. The alpha-numeric identifier must be clearly visible on the two lateral sides of the equipment.

B. Contractor shall provide the following information for material documentation:

1.

Transfer Type	Target Form	Required Information	Frequency	Method
MTL to OSDF MTL	OSDF Manifest	Source MTL; estimated volume; transported by; OSDF initial placement grid and/or grid; material returns/ comments	Per Load	verbal; plus transport signature; record to daily log
MTL to Special Material Transfer Area MTL	FTL	Source MTL; destination MTL; material description; estimated volume or item count	Per event and Per MTL	verbal; plus record to daily log
MTL to other MTLs	FTL	Source MTL; destination MTL; material description; estimated volume or item count	Per day and Per MTL	verbal; plus record to daily log

2. Estimate quantities of material by volumes (cubic yards) and type moved based on visual observations. Use the number of hauls per equipment type and each type's respective capacity to estimate volumes to the nearest 3 cubic yards per load.

3. Identify the type (and placement category for material to be placed in the OSDF) of material, based on a visual observation, in accordance with the OSDF Impacted Material Placement Plan for On Site Disposal Facility and as specified in Section 02205. Provide a general description such as "soil and soil-like material (including flyash, gravel, etc.)", "debris", or "Special Material".
   a. An example of general descriptions of soil or soil-like material is soil with cobbles, gravel, bottom ash flyash.
   b. General descriptions of debris would include concrete, steel, riprap, pipe, culverts, etc.
   c. Hold-up Material is material fixed to the interior of a pipe.
   d. Special Materials will include atypical items like transformers or pressurized containers or other Special Material items as specified in 02205.

C. Carry the OSDF manifest in equipment when hauling to the OSDF.

D. Submit the OSDF manifest to the OSDF Construction Quality Control representative upon arrival at the OSDF.

E. Provide information for FTL(s) for materials moved to the Special Material Transfer Area to the Construction Manager at the time of delivery. Contractor shall record this information in Contractor's daily log.

F. Provide information for materials moved between MTLs (other than OSDF) at the close of business each working day, or at the morning safety briefing on the following working day. Contractor shall record this information in Contractor's daily log.

3.2 PREPARATION

A. Field stake delineation of MTLs as specified in Section 02050.

B. Train and familiarize personnel (minimum of 3) with the material identification and documentation requirements. Identify all competent personnel who will be involved with material identification and documentation to the Construction Manager.

3.3 METHODS AND REPORTING REQUIREMENTS

Comply with detailed methods included in approved Material Identification and Documentation Work Plan.

3.4 FIELD QUALITY CONTROL

The Construction Manager will provide intermittent inspections of material identification and documentation, and work with the Contractor to assist with the implementation of this Section.

END OF SECTION

ATTACHMENT I

OSDF MANIFEST

ATTACHMENT I to Section 02212
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
OSDF MANIFEST

E 1095

Generator Information

Manifest #

1. Project#	2. Project Name	3. Load Date	4. Load Time

Source MTL	Type	Profile #	
See Note 1			See Note 1

7. This material meets the WAC for the FEMP OSDF:

_____ Date: _____
(Generator)

8. Transported by: See Note 2 Org.: _____ Vehicle #: _____ Date: _____

(Transporter)

OSDF Receipt

1. CQC Acceptance: _____ Date: _____ Time: _____

2. Initial Placement: See Note 1 (Cell) See Note 1 (Grid (Cat 2-5))

3. Material Return / Comments: See Note 1 _____

Note 1. Contractor to provide information; FDF to record on form.
Note 2. Contractor equipment operator signature required.
Note 3. All other boxes to be completed by FDF.

ATTACHMENT II

FIELD TRACKING LOG

ATTACHMENT II to Section 02212
Field Tracking Log

1. Project #	2. Project Name	3. Date	Form #
		| | 19	

	4. From:		5. To:		6. Material	7. Volume	8. Waste Disposition Rep. Initials	A. Container Storage	
	Source MTL	Type	Destination MTL	Type	Profile # or Description			Storage Details	Storage Receipt
1.	See Note 1		See Note 1		☐ Th Contaminated Description: see Note 1	yd³ See Note 1		Loc Area R S L	
2.					☐ Th Contaminated	yd³		Loc Area R S L	
3.					☐ Th Contaminated	yd³		Loc Area R S L	
4.					☐ Th Contaminated	yd³		Loc Area R S L	
5.					☐ Th Contaminated	yd³		Loc Area R S L	
6.					☐ Th Contaminated	yd³		Loc Area R S L	

9. Container Destination _____

10. Project Mngr/Designee Name (PRINT): _____

Signature: _____ Date: _____

Entry Block Notes:
1. Enter the Project Number
2. Enter the Project Name
3. Enter today's date in MM/DD/YYYY format.
4. Enter the IIMS Designation for the source MTL and MTL Type.
   MTL Types: C = Container D = Material Drop-off F = Facility/Building G = Grid
   I = Interim Project Area P = Special Area S = Stockpile W = WAC Attainment Area
5. Enter the IIMS Designation for the destination MTL and MTL Type. Note: Use OSDF Manifest for shipments of impacted material to the OSDF. MTL Type codes are the same as in block 4.
6. Enter either the Profile Number or the Material Description Code of the material being moved. Profile Numbers to be used for above-grade debris are listed on the reverse of this form or on the Project MSCC. Material Description Codes for interim movements are:
   A = Asphalt/Concrete O = Other Manufactered Debris R = Rocks/Gravel
   S = Soil V = Vegetation/Organic Debris
7. Volume to the nearest cubic yard.
8. Printed initials of the project waste disposition representative responsible for oversight of waste generation/packaging activities.
9. Container storage facility assigned by waste disposition representative. Leave blank if the material is to be transported directly to a bulk waste management unit (stockpile or OSDF) as indicated by destination MTL in Block 5. If more than one container facility is to be utilzed, use a separate form for each.
10. Printed name of FDF Project Manager or designee, signature, and date of signature.

Section A. Container staging information: for MC&A use only.

COPY 1: WDSS Records

SECTION 02270
EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Soil erosion and sedimentation control measures for work included in this contract including areas graded or disturbed by the Contractor.

B. Installation, maintenance, and removal of all temporary erosion control facilities.

C. Installation of dumped rock fill, erosion control blankets, and geotextile for ditches and erosion control areas.

D. Management of erosion and sediment control measures installed by this contract and existing erosion and sediment control measures and facilities including Area 1, Phase I (A1PI) Sediment Traps, and A1PI Sediment Basin and related appurtenances, as shown on the Construction Drawings.

E. Installation of Continuous Berm.

F. Control of surface water and management of ponded water in construction and excavation areas.

G. Installation of Rock Check Dams.

1.2 RELATED SECTIONS AND PLANS

A. Section 01011 - Submittals.

B. Section 01012 - Schedule of Drawings.

C. Section 02100 - Site Preparation.

D. Section 02205 - Impacted Material Excavation and Handling.

E. Section 02206 - General Earthwork, Backfilling and Interim Grading.

F. Section 02212 - Material Identification and Documentation.

G. Section 02900 - Soil Preparation and Seeding.

G. Part 6 - Statement of Work.

H. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. State of Ohio, Department of Transportation (ODOT): Construction and Material Specifications, January 1, 1997.

B. State of Ohio, Department of Natural Resources (ODNR): Rainwater and Land Development, Ohio's Standard for Stormwater Management, Land Development, and Urban Stream Protection - 1996.

C. Sitewide Excavation Plan, July 1997, Revision C.

D. Waste Acceptance Criteria Attainment Plan for the On Site Disposal Facility, August 1997, Revision B.

E. Storm Water Pollution Prevention Plan, (RM-0039), 1996, Revision 0.

F. American Society for Testing and Materials (ASTM) standards:

1. ASTM D3786-87 Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Tester Method.

2.	ASTM D4491-96	Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
3.	ASTM D4533-91	Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
4.	ASTM D4632-91	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
5.	ASTM D4751-95	Standard Test Method for Determining Apparent Opening Size of a Geotextile.
6.	ASTM D4833-88	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. For each product proposed for use, submit the following to the Construction Manager for review within 10 calendar days from the Notice to Proceed:
   1. Manufacturer's product data and recommended methods of installation; and
   2. Certification from supplier or manufacturer that the product meets the material requirements of this Section.

C. Prepare and submit to the Construction Manager within ten (10) calendar days from Notice to Proceed a Surface Water Management and Erosion and Sediment Control Plan that includes the following, at a minimum:
   1. Description of the surface water management and erosion and sediment control measures to be implemented throughout the duration of the contract for Non-Impacted areas and Impacted areas.
   2. Methods for installing and maintaining surface water management and erosion and sediment control measures for Non-Impacted areas and Impacted area.

3. Drawings illustrating, in plan view, the location and sequencing of the surface water management and erosion and sediment control measures.
4. Methods and measures for collection and discharge of surface water from the excavated areas and measures to minimize erosion of the excavated areas during progress of the work, inclement weather and at the end of each work day.
5. Plans shall show method of collection, diversion of surface water from Non-Impacted area trenches, and planned parts of discharge with adequate outlet protection.
6. Plans shall show method of collection, diversion of surface water from Impacted trenches and transfer to tank farm.

1.6 QUALITY ASSURANCE

A. Inspect erosion and sediment control measures to evaluate the effectiveness of, and need for maintenance of, the control measures. Any repairs to the erosion and sediment control measures shall be corrected within 24 hours of problem discovery. Inspections shall occur, at a minimum, at the following frequencies:
1. Weekly;
2. Daily after each rain event exceeding 0.5 inches at the Fernald Environmental Management Project (FEMP).
3. At least daily during prolonged rainfall events at the FEMP.

B. Records of inspections shall be kept on file at Contractor's site office and shall be submitted monthly to the Construction Manager.

1.7 HEALTH AND SAFETY REQUIREMENTS

A. Environmental Health and Safety, and Training requirements shall be as specified in Part 8.

PART 2 PRODUCTS

2.1 MATERIALS

A. Silt fence shall:
   1. be composed of strong rot-proof polymeric fibers formed into a woven or non-woven fabric which meets the requirements as indicated on the Construction Drawings; and
   2. have fence post properties and minimum dimensions as shown on the drawings.

B. Dumped Rock Fill: Dumped rock fill shall meet the requirements of Type C, ODOT Item 601.07.

C. Continuous Berm: Continuous Berm shall be constructed using equipment manufactured by MBW Inc. or approved equal. Material to fill Continuous Berm shall be Type S1 soil, as specified in Section 02206.

D. Non-woven geotextile fabric used as a separator beneath dumped rock fill and for continuous berm and underneath stockpiles, gravel roads, and Special Material Transfer Area shall meet the following minimum values:

PROPERTY	TEST METHOD	ROLL VALUES
Grab Tensile Strength (lbs)	ASTM D4632	80
Puncture (lbs)	ASTM D4833	25
Trapezoidal Tear (lbs)	ASTM D4533	25
Mullen Burst (psi)	ASTM D3786	130
Apparent Opening Size	ASTM D4751	less than 0.6mm
Permittivity (cm/sec^2)	ASTM D4491	1×10^{-2}

E. Seeding shall be in accordance with Section 02900.

F. The erosion control blanket shall be constructed of 100 percent coconut fiber stitch bonded between a heavy duty UV stabilized bottom net and a heavy duty UV stabilized top net. The crimped netting shall form prominently closely spaced ridges across the entire width of the mat. The netting shall be stitched together on 1.5 inch centers with UV stabilized polyester thread to form a permanent three dimensional structure. The mat shall have the following physical properties and be rated for 2 years service life for use on 1:1 slopes.

1. Material Content
   a. Coconut fiber: 100 percent; 0.5 pounds per square yard.
   b. Netting: Top and bottom - Heavy UV stabilized; polypropylene; 3 pounds per 1,000 square feet.
   c. Thread: UV stabilized polyester.

2. Physical Specifications (Roll)
   a. Width: 6.5 feet.
   b. Length: 83.5 feet.
   c. Weight: 30 lbs ±10 percent.
   d. Area: 60 square yards.

G. Crusting agent shall be as approved by the Construction Manager and shall meet the following requirements:
   1. The dust suppression/crusting agent shall be a pine sap emulsion comprised of a 100% organic emulsion produced from naturally occurring resins (pine sap). The dust suppression/crusting agent shall not be comprised of chloride, lignosulfonate, petroleum, or asphaltic type emulsions. The dust suppression/crusting agent must provide dust suppression and surface stability for exposed soils, both disturbed and undisturbed soils, and exposed coal fired boiler ash (flyash). The dust suppression/crusting agent shall be compatible with application via a hydro seeder, and must not require intense cleaning of equipment after application. Once cured, the dust suppression/crusting agent shall be non-tracking (i.e., will not stick to boots or tires).
   2. The dust suppression/crusting agent shall not have hazardous characteristics of ignitability, corrosivity, reactivity, or toxicity as defined in 40 CFR 261 for a hazardous waste in either its pre-applied or cured states.
   3. The dust suppression/crusting agent shall have a flash point greater than 200°F. The dust suppression/crusting agent shall be neither a flammable nor combustible liquid per DOT definition. The dust suppression/crusting agent must not be susceptible to significant deterioration from exposure to the elements, including sunlight.

PART 3 EXECUTION

3.1 GENERAL

A. Construct and maintain erosion and sediment control measures as specified in this Section, and as shown on the Construction Drawings. Maintain existing erosion and sediment control facilities and measures in accordance with Part 6.

B. As the Sewage Treatment Plant (STP) excavation progresses, excavate depressions in the excavated area to be used as temporary water collection sumps as shown on the Construction Drawings. Water accumulated in the sumps shall be pumped directly to the Tank Farm via portable sump pump system and flexible hose.

C. Excavations, other than at the STP, shall be sloped to sumps and/or graded to drain to existing ditches discharging to the nearest sediment basin. Excavations are to be kept free of standing water. Runoff into excavation areas shall be minimized by grading the surrounding area away from the excavation area and/or by diversions.

D. Remove erosion and sediment control measures at the direction of the Construction Manager after the disturbed areas are established with satisfactory conditions of seeding as specified in Section 02900.

3.2 SILT FENCES

A. Install in accordance with the requirements of the ODNR Rainwater and Land Development Standards. Place at locations shown on Construction Drawings prior to start of site preparation and excavation activities. Remove accumulated sediment when deposition reaches one-half the height of the silt fence or sooner if accumulated sediment prevents performance of silt fence; remove accumulated sediment within 24 hours of discovery. Sediment shall be removed as specified in Section 02205.

3.3 EROSION CONTROL BLANKETS

A. Install in accordance with manufacturer's recommendations in the ditches shown on the Construction Drawings. Erosion control blankets shall be anchored with wire staples, spaced at a maximum of 3 foot on center, with size as shown on the Construction Drawings.

3.4 INACTIVE EXPOSED EXCAVATION & CONSTRUCTION AREAS

A. Forty-five (45) calendar days shall be the maximum time that an area can be left in an exposed condition without seeding. If an exposed excavation area shall not be worked for a period of 45 calendar days, or more, the soils shall be stabilized within 7 calendar days of excavation by one of the following methods:

1. During the seeding season, temporary seeding shall be applied as specified in Section 02900.
2. During non-seeding seasons, crusting agents shall be applied as specified in this Section.

B. Forty-five (45) calendar days shall be the maximum time that a stockpile can be left in an exposed condition without seeding. Stockpiles that are to be inactive for a period of 45 calendar days shall be stabilized within 7 calendar days by means of a crusting agent, as specified in this Section.

C. These requirements shall not apply to utility trenches.

3.5 CONTINUOUS BERM

A. Construct in accordance with manufacturer's specifications and install in accordance with Construction Drawings.

3.6 SEDIMENT BASINS AND DITCHES

A. Remove accumulated sediment and debris from the existing sediment basins and ditches as directed by the Construction Manager. In no case shall sediment build up to a depth greater than the painted indicator on the riser pipe in the sediment basins or to a depth greater than one-half the constructed depth of the ditch.

B. Remove sediment and debris as specified in Section 02205.

3.7 DUMPED ROCK FILL

A. Place and maintain dumped rock fill as indicated on the Construction Drawings and in accordance with ODOt Item 601.07.

3.8 ROCK CHECK DAM

A. Place and maintain Rock Check Dam as indicated on the Construction Drawings.

3.9 REMOVAL OF TEMPORARY EROSION CONTROL FACILITIES

A. Erosion control facilities shall be removed at the direction of the Construction Manager after the disturbed areas are certified.

END OF SECTION

SECTION 02506
AGGREGATE SURFACE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation and compaction requirements for aggregate surfaces:
   1. Roads.
   2. Parking areas, transfer areas, and walks.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 01012 - Schedule of Drawings.

D. Section 02200 - Non-Impacted Material Excavation.

E. Section 02206 - General Earthwork, Backfilling and Interim Grading.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. State of Ohio, Department of Transportation (ODOT), Construction and Material Specifications, January 1, 1997. Except as supplemented or otherwise modified herein and/or shown on the Construction Drawings. The entire work under this Section shall be in compliance with the provisions of ODOT.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. Materials Source: Submit names of material suppliers. Change of source requires the Construction Manager's approval.

C. Material suppliers shall be required to certify that supplied materials meet specifications prior to use.

PART 2 PRODUCTS

2.1 MATERIALS

A. Aggregate materials shall meet the requirements specified in Section 02206.

B. Geotextile fabrics shall conform to ODOT Item 712.09, Type D.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Verify grades and elevations of subgrade are correct.

B. Verify that compacted subgrade is dry and not frozen, soft, or spongy.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Prepare subgrade according to Section 02206.

B. Place geotextile on subgrade for roads, and queue area in accordance with manufacturer's installation instructions and as follows:

1. Geotextile fabric shall be placed directly over the subgrade. The geotextile fabric shall be placed and temporarily anchored in such a manner that placement of overlying materials will not excessively stretch or tear the fabric.
2. Geotextile fabric shall be installed to limits and grades indicated on plans for all new work. The geotextile shall not be dragged across the subgrade. The geotextile fabric shall be unrolled as smooth as possible on the prepared subgrade.

Wrinkles and folds in the geotextile shall be removed by stretching and placing of sod staples or small aggregate piles as required. The fabric shall be installed according to the manufacturer's suggestion at curve locations.

3. The geotextile shall be field joined, factory seamed, or manufactured in seamless width. Methods of field joining shall include overlapping of adjacent edges and ends of geotextile or sewing of adjacent edges and ends of geotextile. Sand bags or other weights may be used for temporary anchoring. Overlap at edges and ends of geotextile shall be per manufacturer's installation instructions.
4. The geotextile fabric shall extend to the edges of the road aggregate surface.
5. Exposure of geotextiles to elements between lay down and cover shall be a maximum of 7 days to minimize damage potential by ultraviolet light.
6. End dumping or tailgate dumping shall not be permitted directly onto the geotextile fabric. The aggregate shall be dumped adjacent to the fabric or on previously placed stone. The aggregate shall be spread from the backdumped pile using a bulldozer, loader, track hoe, or grader, with care being taken to avoid damage to the fabric by blades, tracks, tires, or buckets. The initial lift of aggregate on the geotextile fabric shall be a minimum thickness of 6 inches after compaction and shall be compacted with a smooth drum roller to the minimum compacted density per Section 02206.
7. Thickness of aggregate shall be as shown on Construction Drawings.
8. Aggregate shall be Type A2 as specified in Section 02206.
9. Construction traffic shall not be permitted directly on the geotextile fabric.

C. When additional aggregate material is to be added to existing compacted aggregate, scarify existing aggregate to a depth of 3 inches.

3.3 QUALITY CONTROL

A. Work shall be performed in accordance with ODOT requirements.

B. Tolerances

1. The top of the aggregate surface shall be a uniformly smooth grade surface without high or low points and shall not be more than 0.10 feet above or below specified grades.
2. The thickness of the finished aggregate course shall be no less, at any point, than the thickness indicated on the drawings.

END OF SECTION

SECTION 02668
REMEDIATION GENERATED WATER TRANSFER LINES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe and fittings for remediation generated water transfer lines.

B. Tap connections tie-in.

C. Manhole tie-in.

1.2 RELATED SECTIONS AND PLANS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 01012 - Schedule of Drawings.

D. Section 02050 - Surveying.

E. Section 02200 - Non-Impacted Material Excavation.

F. Section 02206 - General Earthwork, Backfilling and Interim Grading.

G. Section 15060 - Pipe, Fitting, Valves and Accessories.

H. Part 6 - Statement of Work.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):

1.	ASTM D3035-95	Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
2.	ASTM D3261-96	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
3.	ASTM D3350-96	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

B. American Welding Society, Inc. (AWS):

1.	AWS D1.1-96	Structural Welding Code - Steel.

C. State of Ohio, Department of Transportation (ODOT), Construction and Materials Specifications, January 1, 1997.

D. American Water Works Association (AWWA):

1.	AWWA C600-93	Installation of Ductile-Iron Water Mains and Their Appurtenances.
2.	AWWA C906-90	Polyethylene (PE) Pressure Pipe and Fittings, 4-in. Through 63-in., for Water Distribution.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01011, Submittals.

B. Product Data: Provide data on all pipe materials, pipe fittings, valves, accessories, the methods and equipment for HDPE fusion welding.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents:
1. Accurately record work on as-built drawings as specified in Section 02050.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

A. Piping: Manufacturer's name and pressure rating shall be marked on side of pipe.

PART 2 PRODUCTS

2.1 MATERIALS

A. Pipe
1. HDPE Pipe: ASTM D3035, SDR 11 for 150 psi pressure rating (150 psi test pressure rating).
   a. Fitting: AWWA C906, molded, butt fusion weld to pipe. Size as specified on Construction Drawings.
   b. Joints: Butt fusion, flanged gasket joints, and molded adapter pipe at interface connections with ductile iron or carbon steel pipe and valves.
   c. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "stormwater service" in large letters.

B. Bedding Materials
1. Bedding: Fill Type A3 as specified in Section 02206, Restoration and Backfilling.

C. See Section 15060 for pipe, fittings, valves and accessories.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions. Any discrepancies should be brought to Construction Manager's attention in a written statement immediately upon discovery.

B. Verify that tie-in connection, and line size, location, and inverts are as indicated.

3.2 PREPARATION

A. Remove scale and dirt on inside and outside before assembly.

B. Excavate pipe trench in accordance with Section 02200, Non-Impacted Material Excavation, for work of this Section. Locate all existing utilities in the area and determine if they will interfere with the proposed utility. Notify Construction Manager if there is an interference.

C. Remove existing pipe to the extent necessary to make new tie-ins. Tie-in locations shall be adjusted to conform to field conditions.

3.3 ERECTION/INSTALLATION/APPLICATION

A. Installation - Pipe: From manhole tie-in to the tie-in at the Tank Farm. See Piping Construction Drawings and Specification for work in the Tank Farm.

1. Maintain separation of stormwater transfer line from potable water piping (10-foot horizontal minimum, 18-inch vertical minimum).
2. Install pipe to indicated elevation to within tolerance of 5/8 inches at manhole twin.
3. Install HDPE piping, and fittings to AWWA C906 (by butt weld fusion method, in accordance with ASTM D3261).
4. Route pipe in line as shown on Construction Drawings. The minimum bending radius shall be as specified by the pipe manufacturer. Pipe shall be in a straight route at manhole connection.
5. Install pipe to allow for expansion and contraction without stressing pipe or joints as per manufacturer's recommendation.

6. Form and place concrete for thrust blocks at each molded elbow of pipe main.
7. Establish elevations of buried piping to ensure not less than 3.0 feet of cover.
8. Install trace wire continuous over top of pipe, as shown on Construction Drawings.
9. Backfill trench in accordance with Section 02206, Restoration and Backfilling.

B. Excess Debris and Waste:
1. Excess debris and waste generated as a result of the work shall be handled by the Contractor as described in Part 6 of Contract Documents.

3.4 FIELD QUALITY ASSURANCE

A. Perform hydrostatic tests on stormwater transfer line in accordance with AWWA C600. Notify Construction Manager at least 24 hours in advance of planned testing. Submit report to Construction Manager within 1 week after completion of test. Coordinate disposal of test water with Construction Manager.

END OF SECTION

SECTION 02720
STORM DRAIN PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Culverts and headwalls.

B. Principal spillway riser and barrel.

1.2 RELATED SECTIONS AND PLANS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 01012 - Schedule of Drawings.

D. Section 02050 - Surveying.

E. Section 02200 - Non-Impacted Material Excavation.

F. Section 02206 - General Earthwork, Backfilling and Interim Grading.

G. Section 02270 - Erosion and Sediment Control.

H. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. State of Ohio, Department of Transportation, Construction and Material Specifications, January 1, 1997 (ODOT). Except as supplemented or otherwise modified herein and/or shown on the construction drawings, the entire

work under this section shall be in compliance with the provisions of ODOT.

B. American Association of State Highway and Transportation Officials (AASHTO):

1.	AASHTO M36/ M36M-91	Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. Project Record Documents: Accurately record actual locations per Section 02050.

C. Product Data:
1. Provide data on all pipe and culvert materials, fittings, and accessories.

D. Submit manufacturer's certification that materials supplied meet or exceed the requirements specified.

1.6 HEALTH AND SAFETY REQUIREMENTS

A. Environmental Health and Safety, and Training requirements shall be specified in Part 8 of Contract Documents.

PART 2 PRODUCTS

2.1 MATERIALS

A. Corrugated Metal Pipe
1. Corrugated metal spillway riser and barrel, culverts and fittings shall be in accordance with ODOT 707 of 14-gage thickness galvanized, 3 by 1 corrugation and of the sizes specified on the Construction Drawings.
2. Coupling bands shall be corrugated, galvanized steel bands in accordance with AASHTO M36. Pipe sections with rerolled ends shall be joined with

annular corrugated connecting bands. Helically corrugated pipe ends shall be joined using helically corrugated connecting bands. Joints shall have gaskets for water tightness as approved by piping manufacturer.

3. Anti-seep collar, corrugated metal plate, minimum 14 gage thickness, galvanized, of size specified on Construction Drawings. Fabricated such that installation provides watertight seal around spillway barrel pipe.

B. Corrugated polyethylene smooth lined pipe shall be in accordance with ODOT 707.33.

C. Backfilling for headwalls and culverts shall be in accordance with ODOT 503 and Section 02206.

D. See Section 02270 for dumped rock fill used for outlet protection of culverts.

E. Concrete Materials:

1. Concrete: ODOT Item 499, Class F, 3,000 psi compressive strength at 28 days. Poured against undisturbed soil or compacted fill.
2. Reinforcing Steel: All reinforcing steel shall meet the requirements of ODOT 709.01, 60 ksi yield grade, deformed billet steel bars, plain finish.

F. Bedding and backfilling shall be in accordance with Section 02206.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Verify that excavations are ready to receive work.

3.2 ERECTION/INSTALLATION/APPLICATION

A. General

1. Excavation shall conform to Section 02200.
2. Backfill compaction and testing shall conform to the requirements of Section 02206.

B. Corrugated Pipe

1. The pipe and fittings shall be free of foreign materials and visible defects. The ends of the pipe shall be cut squarely and cleanly so as not to adversely affect joining.
2. All pipe shall be laid as shown in the Construction Drawings.
3. Each piece of pipe shall be carefully inspected before it is placed and no defective pipe shall be laid in trench. Prior to laying metal pipe, coat areas where the galvanizing finish has been removed or damaged with a zinc-enriched paint. Trench bottoms found to be unsuitable for foundations after pipe laying operations have started shall be corrected and brought to specified line and grade with approved bedding materials.
4. Joints for corrugated metal pipe shall be made with corrugated galvanized steel coupling bands and gaskets in accordance with AASHTO M36.
5. Headwalls shall be built according to the Construction Drawings and ODOT Item 511.
6. Spillway riser and barrel shall be built according to the Construction Drawings.

3.3 QUALITY CONTROL

A. Inspection: After the Contractor has performed the inspections, and prior to testing and backfill, the Contractor shall notify Construction Manager.

1. Inspection shall include checking for proper alignment and location of all piping.
2. Joints shall be tight and properly seated as per the manufacturer's recommendations.
3. Inspection by the Construction Manager is required prior to and immediately after placing backfill over pipe.

B. Prior to formal acceptance of the work, piping must be free of debris, dirt, sand, silt, or other foreign matter.

C. The Contractor shall notify the Construction Manager of testing/inspection activities at least 24 hours prior to the start of all tests or inspections.

D. Testing of backfill compaction shall be as specified in Section 02206.

END OF SECTION

SECTION 02850
EQUIPMENT DECONTAMINATION FACILITY

PART 1 GENERAL

1.1 SCOPE

A. This section includes:
   1. Materials and construction of the equipment decontamination facility.
   2. Performance criteria for the equipment decontamination facility.

1.2 RELATED SECTIONS

A. Section 01011 - Submittals

B. Section 02200 - Non-Impacted Material Excavation.

C. Section 02206 - General Earthwork, Backfilling and Interim Grading.

D. Section 02270 - Erosion and Sediment Control.

E. Section 02720 - Site Drainage and Water Management

F. Section 02900 - Soil Preparation and Seeding.

1.3 REFERENCES

A. Latest version of American Society for Testing Materials (ASTM) Standards:

1.	ASTM D 638-96	Standard Test Method for Tensile Properties of Plastics.
2.	ASTM D 751-95	Standard Test Methods for Coated Fabrics.
3.	ASTM D 1004-94	Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting.

4.	ASTM D 1248-84	Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
5.	ASTM D 1505-96	Standard Test Method for Density of Plastics by the Density-Gradient Technique.
6.	ASTM D 1593-92	Standard Specification for Non-rigid Vinyl Chloride Plastic Sheeting.
7.	ASTM D 3261-95	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
8.	ASTM D 3350-96	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
9.	ASTM D 3776-96	Standard Test Method for Mass Per Unit Area (Weight) of Fabric.
10.	ASTM D 3786-87	Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Tester Method.
11.	ASTM D 4437-84	Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.
12.	ASTM D 4533-91	Standard Test Method for Trapezoidal Tearing Strength of Geotextiles.
13.	ASTM D 4632-91	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
14.	ASTM F 714-95	Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

15. ASTM F 810-93 — Standard Specification for Smoothwall Polyethylene (PE) Pipe for Use in Drainage and Waste Disposal Absorption Fields.

B. Federal Test Method Standard (FTMS):
1. FTMS 101B-71, — Method 2065, Puncture Resistance and Elongation Test.

C. Geosynthetics Research Institute (GRI):
1. GRI Test Method GM6 — Standard Practice for Pressurized Air Channel Test for Dual Seamed Geomembranes, latest revision.

D. National Sanitation Foundation (NSF):
1. Standard Number 54-93 — Flexible Membrane Liners.

E. State of Ohio, Department of Transportation (ODOT), Construction and Material Specifications, 1997

F. United States Environmental Protection Agency (US EPA):
1. US EPA Technical Guidance Document EPA/600/2-88/052 — Lining of Waste Containment and Other Impoundment Facilities, 1988.
2. US EPA Technical Guidance Document EPA/530/SW-91/051 — Inspection Techniques for the Fabrication of Geomembrane Field Seams, May 1991.

1.4 DEFINITIONS OF TERMS

A. Geomembrane Manufacturer: The manufacturer is the firm or corporation responsible for production of the finished rolls of geomembrane material from raw material polymer to be used in the project. The manufacturer is responsible for the condition of the geomembrane until the material is accepted by the Construction Manager or designated field representative upon delivery. The

manufacturer shall produce a consistent product meeting the project specifications and shall provide quality control documentation for the product specified herein.

B. Film Tear Bond (FTB): A failure in the ductile mode of one of the bonded sheets by testing prior to complete separation to the bonded area as depicted in US EPA Technical Guidance Document EPA/600/2-88/052. A seam shall be classified as a FTB if no greater than 10 percent of the seam width peels (separates) at any point.

C. Geomembrane: A synthetic lining material, also referred to as a flexible membrane liner (FML).

1.5 QUALITY ASSURANCE PROGRAM

A. A laboratory shall be maintained by the manufacturer of the geomembrane materials at the point of manufacture to ensure quality control in accordance with ASTM and FTMS testing procedures (referenced in Section 1.3, as applicable). That laboratory shall maintain records of its quality control results and provide to the Construction Manager prior to shipment, a Certificate of Compliance stating that all rolls of geomembrane material supplied are in compliance with specification physical properties requirements.

B. The certificate shall include the name of the manufacturer, chemical composition, product description, statement of compliance to specification physical properties requirements, and the signature of authorized official attesting to the information required.

C. Testing of factory fabricated seams for geomembrane shall be performed by the manufacturer. The manufacturer shall inspect and test 100 percent of factory fabricated seams in accordance with these specifications.

D. Testing of geomembrane materials during construction will be performed by the Contractor.

E. Geomembrane shall be randomly sampled and tested in accordance with the manufacturer's approved QC manual. Samples not meeting the minimum requirements specified shall result in the rejection of the applicable sheets.

F. The Contractor's Installation Supervisor shall have demonstrated experience in installing and seaming of HDPE geomembrane liner systems for similar applications. The Installation Supervisor shall remain on site and be responsible for the liner layout, seaming, patching, repairs, testing coordination with the Construction Manager, and all other activities associated with installation of the geomembrane.

1.7 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. Submit an Equipment Decontamination Plan to the Construction Manager for approval. The plan shall include, type of spray equipment, method of water storage, sump pump and discharge line, and any cleaning agents proposed. Include a contingency for the use of a steam cleaner.

C. Submit samples of the proposed geomembrane.

D. Submit a Certificate of Compliance from the manufacturer in accordance with Part 6 of the Contract Documents, and in accordance with Article 1.6 for the geomembrane material.

E. Submit quality control certificates issued by the producer of the raw materials used to manufacture the geomembrane. These certificates shall include the following.

1. Origin, identification, and production plant location of the resin used to manufacture the geomembrane.

2. Reports of testing conducted to verify the quality of the resin including the stabilization compounds used to manufacture the geomembrane, with signature of authorized official. Properties testing typically performed by the resin manufacturer shall be included in the reports.

F. Shop Drawings: Submit shop drawings showing proposed geomembrane panel layout, panel size, shop and field seams, and location of test coupons. The drawings shall include number or letter or panels and cross-reference surrounding panels, details of seaming the geomembrane, and other construction related details. Shop drawings shall be prepared in accordance with Part 6 of the Contract Documents.

G. As-builts: Submit as-built drawings showing geomembrane panel layout, panels size, seam type and location, location of test coupons, and areas where repairs were made. Drawings shall be prepared in accordance with Part 6 of the Contract Documents.

H. Submit inspection and testing data for factory fabricated seams.

I. Submit geomembrane manufacturer's quality control manual including description of laboratory facilities.

J. Submit results of the manufacturer's physical properties testing in accordance with the approved QA Manual. Testing shall include, but not be limited to, the typical properties outlined in Table 1.

K. Submit Certificate of Compliance from the geotextile manufacturer attesting to conformance with the specifications.

L. Provide product data on all pipe materials, fittings, methods and equipment for HDPE fusion welding, HDPE manhole, and manhole frame and cover.

M. Provide detailed shop drawings for approval of HDPE manhole. Drawings shall show plan and section view of manhole, invert of pipe, pipe size, and weld types/details.

N. Provide catalog/product data on all pump and spray equipment, including any ancillary equipment.

O. Submit construction sequence and schedule in accordance with Article 1.9

P. Operation and maintenance requirements and schedule.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Each roll of geomembrane shall be marked to show the following minimum information:
1. Name of manufacturer.
2. Product type.
3. Physical dimensions (length and width).
4. Roll identification number.

B. The Contractor shall review, inspect, and place into proper storage all materials received on site until their installation. All such materials shall be inspected to verify their conformance with the requirements of these specifications and that they are free of defects. Any nonconforming or defective materials shall be clearly marked and promptly repaired per approved procedure or removed from the job site.

C. When the geomembrane materials are delivered to the construction site, the Construction Manager, or designated representative, will inspect to confirm that the material is the material that was specified and that the material is not damaged. Inspection activities shall prevent, detect, and correct the following:
1. Puncture from nails or splinters.
2. Tears from operation of equipment or inadequate packaging.

3. Blocking (the bonding together of adjacent membrane layers), which may be caused by excessive heat.
4. Crumpling or tearing from inadequate packaging support.

D. Handling
1. Palleted geomembrane panels shall be accordion folded width-wise and length-wise without causing damage to the geomembrane.
2. Banding straps around the geomembrane and pallet shall be properly cushioned so as not to cause damage to any part of the geomembrane panel.
3. The stacking of palleted geomembrane panels on top of one another is not permitted.
4. Damage shall be avoided by careful handling of the geomembrane material during preparation for shipment and of the packaged crates and rolls of material.
5. When damage to a crate or roll cover has occurred, careful examination of the underlying material is required. If damage is found, the Liner Subcontractor and Construction Manager shall carefully examine the entire shipment for damage.

E. Storage: Sufficient quantities of materials shall be stockpiled to meet project schedule and requirements. Materials shall be stored on site at locations designated by the Construction Manager.

F. The Contractor shall be responsible for unloading, storage, and care of the geomembrane material until such material has been incorporated into the work. Materials shall be stored in a manner that prevents damage in accordance with the manufacturer's recommendations. The materials shall be stored on a prepared surface (excluding wooden pallets) and shall not be stacked more than two rolls high.

G. The Contractor shall be responsible for replacing any damaged or unacceptable material at the Contractor's expense.

1.9 PROJECT/SITE CONDITIONS

A. Water for operation of the equipment decontamination facility is available from the OSDF Well as shown on the Construction Drawings.

B. No electric power will be provided at the equipment decontamination facility. The Contractor shall utilize engine driven equipment, or portable generator.

1.10 SEQUENCING AND SCHEDULING

A. The Contractor shall provide a sequence and schedule of work to the Construction Manager for the approval.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sump Pump and Discharge Piping

1. The Contractor shall be responsible for providing the equipment decontamination facility sump pump and discharge piping. The sump pump shall be portable, self powered, and shall be capable of transferring water collected in the sump to the temporary storage tanks shown on the Construction Drawings. The discharge piping shall be suitable for above-ground transfer of water collected in the sump to the temporary storage tanks. The contractor is responsible for the design of the discharge piping to include all supports, bracing, and thrust restraints.

B. Perforated Pipe

1. Perforated pipe and fittings shall be high-density polyethylene (HDPE) PE 3408 pipe, Type III, Class C, Category 5, Grade P34, in accordance with ASTM D 1248, and cell classification 345434C in accordance with ASTM D 3350. All pipe and fittings shall be of the same material and shall have a Dimension Ratio (DR) of 11 in accordance with ASTM F 714. Pipe and fittings shall be from the same manufacturer.

2. Perforated pipe shall be perforated in accordance with ASTM F 810. Perforations shall consist of two (2) rows of equally spaced, 1/2 inch diameter holes on 5-in. centers. Rows and spaces shall be parallel to the axis of the pipe and shall be 120 ± 5^0 apart.

C. Wind/Overspray Shield

1. Provide fiberglass reinforced polyester sheets as shown on the Construction Drawings. Provide watertight seal between joints.
2. Provide pressure-treated board for use as wood nailers and support posts as shown on the Construction Drawings.
3. Furnish 8-d ring-shank common nails with sealing washers to attached wind/overspray shield.

D. Wood Supports

1. Provide pressure treated wood in accordance with ODOT Item 710.14. Provide ground contact rated material for wood supports.

E. Geotextile Cushion

1. Geotextile fabric used as a cushion layer above and below the geomembrane liner shall be a nonwoven geotextile consisting of polypropylene or polyester filaments or fibers.
2. Minimum average roll values for strength properties of individual rolls tested from manufacturing lot or lots of a particular shipment shall be in excess of the minimum average roll values (MARV) stipulated in Table 1.

Table 1
Physical Requirements for Geotextile Fabric

Property	(MARV)	Test Method
Unit Weight (oz/yd^2)	16	ASTM D 3776
Tensile (Grab) Strength	350 minimum	ASTM D 4632
Elongation (%)	60 minimum	ASTM D 4632
Burst Strength (psi)	500 minimum	ASTM D 3786
Trapezoidal Tear (lb)	115 minimum	ASTM D 4533

F. Geomembrane Liner

1. The geomembrane material used as a liner at the equipment decontamination facility shall be high-density polyethylene (HDPE), unreinforced, smooth surface on both sides.
2. Minimum average roll values for strength properties of individual rolls tested from manufacturing lot or lots of a particular shipment shall be in excess of the typical roll values stipulated in Table 2.

Table 2
Physical Requirements for Geomembrane Liner

Property	Typical Value	Test Method
Thickness	60 mil nominal	ASTM D 1593
Density (g/cm3)	0.94	ASTM D 1505
Tensile Properties (each direction)		
1. Strength @ Yield (lb/in. width)	140	ASTM D 638 (Type IV/2 ipm)
2. Strength @ Break (lb/in. width)	220	"
3. Elongation @ Yield, (%)	13	"
4. Elongation @ Break, (%)	700	"
Tear Resistance (lb)	45	ASTM D 1004 (Die C)
Puncture Resistance, (lb)	80	FMTS 101/ Method 2065

G. Railroad Tie Roadbed

1. Construct equipment decontamination facility road bed from railroad ties.
2. Railroad ties shall be new. Used ties may be substituted, subject to inspection for soundness of each tie by the Construction Manager prior to installation. Unsuitable ties are to be removed immediately by the Contractor.
3. Use pressure-treated boards over the road bed as shown on the Construction Drawings.

H. Drainage Gravel

1. Drainage gravel shall be No. 1 or No. 2 stone, with the fraction smaller than 1/2 inch removed, in accordance with ODOT Item 703.

I. Coarse Aggregate

1. Coarse aggregate shall be in accordance with Section 02206.

J. Geotextile Separator Fabric

1. Geotextile fabric used as a separator between the coarse aggregate and subgrade shall be in accordance with Section 02270.

K. Sump Manhole

1. The sump manhole base, riser, and top shall be high-density polyethylene (HDPE), SDR 11, in accordance with ASTM D 3350. The manhole shall have lifting lugs capable of supporting manhole during placement. All components shall be joined by fusion or extrusion welding. Hot air welding is prohibited.
2. Sump manhole shall be perforated with 1/2 inch diameter holes, spaced 120^0 on center horizontally, and 4 inches on center vertically. Offset holes in adjacent rows by 60 degrees. Perforations shall extend from the bottom of the riser to the bottom of the concrete cover slab.

L. Concrete

1. Concrete materials and construction shall be in accordance with Section 02720.

2.2 EQUIPMENT

A. Provide washing and decontamination equipment, including pressure washers, wash water supply and holding tanks, and other equipment and materials required for equipment decontamination to meet criteria specified in this section. Wash water is available from OSDF/A1PII water supply well. Coordinate use with Construction Manager.

2.3 FABRICATION

A. The geomembrane liner shall be factory seamed into panels as large as possible to minimize the need for field seams.

B. Factory fabrication shall be performed under environmental conditions as recommended by the geomembrane manufacturer.

C. The geomembrane material shall be continuously inspected for uniformity, damage, imperfections, holes, cracks, thin spots, foreign materials, tears, punctures, and blisters. Any imperfections shall be immediately repaired and inspected.

D. All seams shall be visually inspected and results documented.

E. Nondestructive seam testing shall be performed on all fabricated seams over their full length in accordance with ASTM D 4437 and the manufacturer's quality control manual. Test methods shall be vacuum chamber or pressurize air channel, except air lance may be used on inaccessible seams.

F. All inspection and testing of factory seams shall be performed by the manufacturer's laboratory.

G. Failure of the material and/or seams to meet all the requirements of these specifications may be cause for rejection of the geomembrane material and/or seams, as appropriate.

H. In addition to visual inspection and nondestructive testing, a 48-inch sample shall be taken from each factory seam welding unit used in this work at the beginning of every work shift and every 4 hours of production thereafter. Samples shall be from the same production lot as the field panels (i.e., will not require patching of fabricated panels). Test specimens shall be cut at quarter points from each 48-inch seam sample (a total of three places) and tested for factory seam shear strength and peel adhesion. The seam shear strength shall be tested in accordance with ASTM D 4437, as modified in Annex A of NSF 54, and shall have a tensile strength of at least 90 percent of the parent geomembrane strength. Failure of seam shall be classified as FTB. The peel adhesion shall be tested in accordance with ASTM D 4437, as modified in Annex A of NSF 54, and shall provide a peel strength that is greater than 60 percent of the parent geomembrane yield strength. Failure of seam shall be classified as FTB.

PART 3 EXECUTION

3.1 PREPARATION

A. Ensure that the grades and elevations are correct before installation of the geosynthetic materials.

B. Ensure that the finish grade does not contain rocks, roots, vegetation or other debris. Foreign materials and protrusions shall be removed to the maximum extend practicable.

C. The surface over which the lower geotextile cushion in to be installed shall be rolled with a steel-drum roller prior to installation.

D. During installation of the geotextiles and geomembrane, the subgrade shall be kept free of all standing water.

3.2 INSTALLATION

A. Verify gradients and elevation of subgrade, and that subgrade surface has been prepared in accordance with Article 3.1.

B. Install lower geotextile cushion fabric on prepared subgrade in accordance with Construction Drawings prior to installation of geomembrane liner. Seams shall be sewn with nylon thread at a stitch density of at least five stitches per inch. Seams shall be composed of two rows of single thread stitches, or one row of double thread stitches. Minimum overlap for sewn seams shall be 2 in. unless directed otherwise by the Construction Manager. The use of staples or other devices for joining geotextile seams is prohibited.

C. After installation of the lower geotextile cushion, the geomembrane liner shall be placed and anchored in such a manner that the geotextile fabric will not excessively stretch or tear.

D. Appropriate measures shall be taken during installation to provide sufficient slack in the liner to avoid the generation of excessive stresses in the liner due to temperature changes.

E. Field seams shall be made using either the dual hot wedge (fusion) welding or the fillet-extrusion welding process (for areas not accessible with the dual hot wedge method). Field seams shall be made only when weather conditions are favorable. The contact surfaces shall be free of dirt, dust, moisture, or other foreign material. The contact surfaces shall be aligned with sufficient overlap and bonded in accordance with the liner manufacturer's recommended procedures. Wrinkles shall be smoothed out, and seams shall be inspected by

nondestructive testing techniques to verify their integrity.

F. Deployment

1. The geomembrane shall be deployed following the manufacturer's recommendations so that, at the time of installation, it will contain a minimum of wrinkles and be under minimum stress.
2. Each panel/roll of the geomembrane shall be rolled out and installed in accordance with the approved shop drawings. The layout shall be designed to keep field joining of the geomembrane to a minimum and to be consistent with proper methods of geomembrane installation.
3. The geomembrane shall be unfolded or unrolled so as to prevent damage to the underlying or prepared subgrade or geotextile.
4. Should punctures, rips, or tears be encountered in the geomembrane material, the Contractor shall immediately notify the Construction Manager and repair as necessary.

G. Seaming Weather Conditions

1. Normal Weather Conditions
   a. The normal required weather conditions for seaming are as follows:
      1) Ambient temperature as recommended by the manufacturer.
      2) No precipitation or other excessive moisture, such as fog, dew, or ponded water.
      3) No excessive winds.
   b. These weather conditions shall be fulfilled during seaming process.
2. Cold Weather Conditions
   a. If the ambient temperature is below 40 degrees F, seaming of geomembrane shall not be permitted unless the Contractor can demonstrate to the Construction Manager's satisfaction that geomembrane seam quality is not adversely impacted. The following conditions shall also be met to ensure a quality seaming process:

1) Preheating the surface of the geomembrane to achieve normal temperature range.
2) Preheating may be waived by the Construction Manager if the Contractor demonstrates that satisfactory welds of equivalent quality may be obtained without preheating at the expected temperature of installation.
3) Preheating devices shall be approved by the manufacturer.
4) Care shall be taken to ensure that surface temperatures are not lowered below the minimum required surface temperature for welding due to winds.
5) Additional destructive test samples shall be taken at the discretion of the Construction Manager.
6) Trial seams shall be performed under the same ambient temperature conditions as the actual seams.

3. Warm Weather Conditions
   a. If the ambient temperature is above 104 degrees F, seaming of geomembrane shall not be permitted unless the Contractor can demonstrate to the Construction Manager's satisfaction that geomembrane seam quality is not adversely impacted.
   b. Test seams shall be performed under the same ambient temperature conditions as the actual seams.
   c. Additional destructive test samples shall be taken at the discretion of the Construction Manager.

H. Field Seaming
   1. Panel field seaming shall be performed using the dual hot wedge welding techniques as outlined in Section 7 of US EPA Technical Guidance Document EPA/530/SW-91/051. Welding equipment and seaming temperatures shall be in accordance with the manufacturer's recommendations.
   2. Field seams shall be oriented parallel to the line of maximum slope.

3. Unless directed otherwise by the Construction Manager, minimum overlap for field seams shall be in accordance with the manufacturer's recommendations.
4. The welding equipment used shall be capable of continuously monitoring and controlling the temperatures in the zone of contact where the machine is actually fusing the lining material to ensure that changes in environmental conditions will not affect the integrity of the weld.
5. Welding of field seams with an extrusion welder is only acceptable for repairing holes in the liner, repairing failed seams revealed by nondestructive testing, repairing areas where destructive testing is performed, at pipe/liner penetration boots, and other areas where the hot wedge welding machines cannot be used due to space restrictions.

I. The liner shall be placed over the prepared surface in such a manner as to ensure minimum handling. The geomembrane shall not be dragged over rough surfaces. Any damage to the base surface resulting from liner installation or liner handling equipment shall be repaired by the Contractor at its own expense prior to placement of the liner. Vehicular traffic across the geomembrane shall not be allowed. The panels shall be such lengths and widths and shall be placed in such a manner as to minimize field seaming.

J. In areas where wind is prevalent, liner installation shall be started at the upwind side of the project and proceed downwind. The leading edge of the liner shall be secured at all times with sandbags or other means sufficient to hold it down during high winds.

K. Sandbags shall be used as required to hold the liner in position during installation. Materials, equipment, or other items shall not be dragged across the surface of the liner nor be allowed to slide down slopes on the liner.

L. All joints shall be tightly bonded on completion of the work. Any liner surface showing injury resulting from scuffing, penetration by foreign objects, or distress from rough subgrade shall be repaired or replaced as approved by the Construction Manager.

M. Each suspect location shall be nondestructively tested using methods described in Article 1.4 as appropriate. The Contractor shall not proceed with any materials which will cover locations that have been repaired until satisfactory test results have been obtained.

N. Any wrinkles that can fold over shall be repaired either by cutting out excess material or, if possible, allowing the liner to contract due to temperature reduction prior to placing the overlying material. In no case shall material be placed over the geomembrane which could result in the geomembrane folding.

O. Destructive Seam Testing

1. Two types of samples shall be taken at each location, one for field tests and one for laboratory tests.
2. For the field tests, two seam samples, 1 inch wide by 12 inches long with the seam centered across the length shall be taken 42 inches apart. These sample coupons shall be removed by the Contractor for every 200 feet of seam length. A minimum of three samples shall be tested, including at least one for each day's production seaming.
3. Upon obtaining each sample, assign a number to the sample and mark it accordingly. Record sample location on the layout drawing. Record the purpose of the sample (i.e., statistical, routing, or suspicious weld area).
4. These samples shall be tested in the field using a tensiometer capable of quantitatively measuring shear and peel strengths.
5. The sample coupon shall be divided into three equal parts: one part for laboratory testing, one part to the Construction Manager for archive storage, and one part to the Contractor for field testing. The sample

coupon shall be tested in the testing laboratory for shear strength and peel adhesion.

P. Repair Procedures

1. Any portion of the geomembrane failing a destructive test, nondestructive test, or any damaged portion shall be repaired in accordance with this section and the manufacturer's recommendations.
2. All surfaces shall be clean and dry at the time of the repair.
3. The repair procedures, materials, and techniques shall be approved by the Construction Manager in advance of the specific repair. Approved methods from which the selected repair shall be chosen are as follows:
   a. Patching - used to repair large holes, tears, large panel defects, and destructive sample locations.
   b. Capping - used to repair failed welds or to cover seams where welds cannot be nondestructively tested.
   c. Removal - used to replace areas with large defects where the preceding methods are not appropriate. Also used to remove excess material (wrinkles) from the installed geomembranes.
4. If a sample fails one of the destructive tests, the seam shall be reconstructed using one of the following methods:
   a. The seam shall be reconstructed between the location of the sample which failed and the location of the next passing sample in each direction.
   b. The welding path is retraced to an intermediate location at least 10 feet from the location of the failed sample and a second sample is taken for additional testing. If the second test sample passes, the seam shall then be reconstructed between the location of the second test and the original sampled location. If the second test fails, this process shall be repeated.

5. All acceptable seams shall extend between two locations where samples passed the required test and shall include one test location along the reconstructed seam.
6. Each major repair requiring a patch or cap shall be identified on the as-built drawing.
7. Each repair shall be numbered and logged by the Contractor. Each repair shall be nondestructively tested using methods described in this section. Repairs which pass the nondestructive test shall be taken as an indication of an adequate repair. Repairs more than 100 feet long may be sufficient to require destructive test sampling, at the discretion of the Construction Manager. Failed tests indicate that the repair shall be redone and retested until passing test results are achieved. The Construction Manager shall observe all nondestructive testing of repairs. The Contractor shall record the number of each repair, the test location, date, and test outcome.

Q. After installation and acceptance of the geomembrane liner, install upper geotextile cushion fabric on top of the geomembrane liner in accordance with the Construction Drawings. Seams shall be the same as for the lower geotextile cushion. The use of staples or other devices for joining geotextile seams is prohibited.

R. Perforated Pipe
1. Cut pipe squarely in accordance with the manufacturer's recommendations.
2. Pipe and end cap shall be joined by butt-fusion using the heat fusion bonding process. Butt-fusion connections shall be in accordance with ASTM D 3261.
3. Install pipe at locations shown on the Construction Drawings.
4. Perforated pipe shall be installed so that the perforations are not blocked when installed directly onto the upper geotextile cushion.

S. HDPE Sump Manhole

1. Install manhole as shown on the Construction Drawings.
2. Install drainage gravel evenly around manhole to prevent shifting of manhole.
3. Form and place concrete cover slab.

T. Drainage Gravel

1. Over the HDPE geomembrane liner and geotextile cushion, provide a layer of drainage gravel having a completed thickness as shown on the Construction Drawings. The gravel shall be spread in the direction that minimizes wrinkles and precludes damage to the geomembrane liner.
2. Low ground pressure, wide-track type equipment shall be used to distribute the gravel material in a manner which will minimize stress on the underlying geomembrane liner. Do not crowd or shove the gravel material or use the blade to cut into the gravel layer. In areas inaccessible to track-type equipment, the gravel shall be placed with a small backhoe, rubber-tired loader, or other equipment approved by the Construction Manager.
3. Equipment used to haul gravel material shall not drive on top of, nor dump directly onto the geomembrane liner and geotextile cushion. A minimum of 12 inches of gravel shall be kept between the equipment tracks or tires and the geomembrane liner and geotextile cushion. Provide a minimum of 18 inches of gravel material over the perforated pipe.
4. Gravel material shall be placed evenly around the perforated pipe to ensure the integrity of the pipe during construction.
5. After the gravel material has been spread to an elevation at which the railroad tie roadbed is ready to be installed, a minimum of one pass shall be made over the gravel material using a smooth, steel-drum, non-vibratory roller. In inaccessible areas a hand-operated, smooth-drum roller shall be used. After rolling, place additional gravel as needed to achieve

a smooth, even grade in preparation for installation of the railroad tie roadbed.

U. Install railroad tie roadbed and pressure-treated boards as shown on the Construction Drawings.

V. Attach wind/overspray shield to nailers at 18 ±2-inches on center.

W. Upon completion of work in the area, the Construction Manager shall direct the Contractor to remove the facility and haul it to the OSDF. Backfill according to Section 02206. Stabilize the area according to Section 02900.

3.3 Performance Criteria

A. Construct equipment decontamination facility as shown on the Construction Drawings.

B. Provide equipment wash/decontamination and maintenance equipment and materials in accordance with this section, and the approved Equipment Wash Plan.

C. Wheels, tires, undercarriage, and body of equipment shall be decontaminated before leaving the equipment decontamination facility. (Decontamination criteria to be provided by the Construction Manager.)

END OF SECTION

SECTION 02900
SOIL PREPARATION AND SEEDING

PART 1 GENERAL

1.1 SCOPE

A. Temporary seeding.

B. Soil preparation.

C. Fertilizer.

D. Mulch and asphalt emulsion.

1.2 RELATED SECTIONS AND PLANS

A. Section 01011 - Submittals.

B. Section 01012 - Schedule of Drawings.

C. Section 02270 - Erosion and Sediment Control.

D. Part 6 - Statement of Work.

E. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

A. State of Ohio, Department of Natural Resources (ODNR): Rainwater and Land Development, Ohio's Standard for Storm Water Management, Land Development, and Urban Stream Protection - 1996.

B. Sitewide Excavation Plan, July 1997, Revision C.

C. American Association of State Highway and Transportation Officials (AASHTO)
   1. AASHTO M140, latest revision.
   2. AASHTO M208, latest revision.

1.4 REFERENCE DRAWINGS

A. See Schedule of Drawings - Section 01012.

1.5 SUBMITTALS

A. Submittals in accordance with Section 01011.

B. Submit the following to the Construction Manager within 30 calendar days from Notice to Proceed for review and approval:
   1. Proposed seed mixes, mulch, asphalt emulsion tackifier, and fertilizers.
      a. Manufacturer's product data and recommended methods of application for seed, mulches, lime, asphalt emulsion tackifier and fertilizer.
   2. Material Safety Data Sheet (MSDS) for lime, fertilizer, and asphalt emulsion tackifier.

C. Submit certificate of compliance for the following within fifteen (15) calendar days before the seeding. Do not sow seed until the Construction Manager has reviewed the certificates.
   1. Certificate stating seed mixture, guaranteed percentages of purity, weed content, germination of seed, name of seller, the test date for the seed, and the net weight and date of shipment.
   2. Manufacturer's certificate stating the available nutrients contained in the proposed fertilizer;
   3. Manufacturer's certificate stating the lime meets the requirements of this Section;
   4. Manufacturer's certificate stating the wood cellulose mulch meets the requirements of this Section; and
   5. Manufacturer's certificate stating the asphalt emulsion tackifier meets the requirements of this Section.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver containerized materials in uniform packages bearing the name of the manufacturer, the net weight and a statement of content. Deliver containerized materials to the site in original, properly labeled, unopened, clean containers each showing the manufacturer's guaranteed analysis conforming to applicable regulations and standards.

B. Store materials in a dry area in a manner to prevent physical damage from the elements.

1.6 HEALTH AND SAFETY REQUIREMENTS

Environmental Health and Safety, and Training requirements shall be as specified in Part 8 of Contract Documents.

PART 2 PRODUCTS

2.1 MATERIALS

A. Furnish seed labeled in accordance with the U.S. Department of Agriculture (USDA) Rules and Regulations under the Federal Seed Act and applicable State seed laws. Furnish seed in sealed bags or containers bearing the date of expiration. Do not use seed after its expiration date. Each variety of seed shall: have a purity of not less than 90 percent, have a percentage of germination not less than 80 percent, have a weed to seed content of not more than 0.75 percent and contain no noxious weeds. The above percentages are by weight.

B. Seed mixture for temporary seeding from March 1 to November 1 shall be as follows:
   1. Perennial Ryegrass - 40 pounds/acre.
   2. Tall Fescue - 40 pounds/acre.
   3. Annual Ryegrass - 40 pounds/acre.

   Seed mixture from November 1 to Spring seeding, use dormant seeding.

C. Obtain water from the on-site sources shown on the Construction Drawings and specified in Part 6 of Contract Documents, unless otherwise approved by the Construction Manager.

D. Fertilizer:
   1. Use fertilizer that is dry or liquid commercial grade fertilizer, uniform in composition that meets the requirements of all State and Federal regulations and standards of the Association of Agricultural Chemists.
   2. Fertilizer shall be VCOTE 34-0-14 as manufactured by George W. Hill. No substitution allowed.

E. Furnish mulch meeting the following requirements:
   1. Mulch shall be straw or wood cellulose fiber, free of clay, stone, foreign substances, and reasonably free of weeds.
   2. Furnish straw that does not contain sticks larger than 1/4-inch diameter or other materials that may prevent matting down during application. Use straw that is free from mold and other objectionable material and in an air-dry condition suitable for placing with mulch blower equipment or other equipment as approved by the Construction Manager. Dust control during mulch blowing shall meet the dust control requirements specified in Part 6 of Contract Documents. Straw shall be generally 6 inches or more in length.
   3. Mulch applied by spraying shall be a wood cellulose processed into a uniform fibrous physical state. Use wood cellulose fiber containing a green dye that will provide for easy visual inspection for uniformity of slurry spread. The wood cellulose fiber including dye, shall contain no growth or germination inhibiting properties. The wood cellulose fiber shall be manufactured in such a manner that, after addition and agitation in slurry tanks with water, the fibers in the material become uniformly suspended to form a homogeneous material. When sprayed on

the ground, the material shall allow absorption and percolation of moisture. The wood cellulose fiber shall meet the following requirements:

Quantity	Specification Limit
Particle Length	0.375 inch (maximum)
Particle Thickness	0.047 inch (maximum)
pH	4.0 to 8.5
Ash Content	1.6 percent (maximum)
Water Holding Capacity	90 percent (maximum)

F. Furnish lime that shall be agricultural ground limestone with a minimum total neutralizing power of 90 percent. The lime shall have a material gradation of at least 40 percent passing the U.S. Standard Number 100 sieve, and at least 95 percent passing the U.S. Standard Number 8 sieve.

G. Furnish asphalt emulsion tackifier for mulch conforming to AASHTO M 140 or AASHTO M 208. Asphalt emulsion tackifier shall be nontoxic to plants and shall be prepared so that it will not change in transportation or storage.

H. Erosion Control Blanket shall be in accordance with Section 02270.

2.2 EQUIPMENT

Provide equipment of size and type to perform work specified in this Section.

PART 3 EXECUTION

3.1 GENERAL

A. Perform soil preparation by tilling/cultivating, to a depth of approximately 2 inches, to eliminate uneven areas and low spots. Maintain lines, levels and contours.

B. Repeat cultivation in areas where equipment used for hauling and spreading has compacted subgrade.

C. Temporary seeding shall be performed at completion of excavation before pre-certification and after certification. In areas where construction operations on soil will not be performed for 45 days or more, these idle areas should be seeded as soon as possible after grading or shall be seeded within 7 days. Stabilization of the inactive exposed excavation and construction areas shall be as specified in Section 02270.

3.2 APPLICATION

A. Apply fertilizer, lime, seed, mulch and asphalt emulsion tackifier to disturbed areas and areas excavated and graded in this Contract requiring seeding unless otherwise indicated. Do not use on areas receiving Erosion Control Blankets, stockpile areas, and Sewage Treatment Plant (STP) Excavation.

B. Application of Fertilizer:
   1. Apply fertilizer at a uniform rate of 12 pounds per 1000 square feet.
   2. Apply agricultural lime at a rate of two tons per acre.
   3. Disc lime and fertilizer thoroughly into upper 2 inches.
   4. Lightly water to aid the distribution of fertilizer.

C. Sequence of application of temporary seeding mixture, mulch and asphalt emulsion tackifier:
   1. Apply temporary seed mixture at the minimum rate as specified in this Section. Seeding shall be done by hydroseeding, broadcasting, or by drilling to a depth of 0.25 inches followed by cultipacking.
   2. Do not seed areas in excess of that which can be mulched within 24 hours.

3. Seeding season for temporary seeding shall be March 1 through November 1.
4. Within 24 hours following seeding, apply mulch.
5. Straw mulch shall be spread in a 1 to 2 inch layer.
6. Apply water with a fine spray immediately after each area has been straw mulched. Wet soil at approximately a rate of 120 gallons per 1,000 square feet.
7. Apply asphalt emulsion tackifier at the rate specified in this Section.

D. Spread straw mulch, either by hand or by blowing method, at the rate of 2 air-dried tons per acre.

E. Apply sprayed wood cellulose fiber at a net dry weight of 750 pounds per acre. Mix the wood cellulose fiber with water at a ratio of 50 pounds of wood cellulose fiber per 100 gallons of water.

F. Maintain straw mulching material in place with an asphalt emulsion tackifier. Apply asphalt emulsion tackifier at a rate of 120 gallons per acre.

3.3 MAINTENANCE

A. Maintain the seeded areas in satisfactory condition until acceptance of the seeding by the Construction Manager. Maintenance of the seeded areas includes repairing eroded areas, revegetating when necessary, watering and mowing (if applicable). A satisfactory condition of the vegetated area is defined as follows:
1. An area shall have a good, clean stand of perennial grass.
2. Within 3 weeks, germination must occur over 95 percent of the area with no single bare area greater than 3 square feet.
3. Within 3 months, 95 percent of the area must be covered with mature perennial grass.

B. Areas that fail to meet these requirements shall be repaired or reseeded as necessary to produce an acceptable stand of grass, as specified in this Section.

3.4 ACCEPTANCE

A. Seeded areas shall be subject to a warranty period of not less than 12 months from initial establishment of temporary seeding over 100 percent of the seeded areas.

B. At the end of the warranty period, the Construction Manager will perform an inspection upon written request by the Contractor. Seeded areas not demonstrating satisfactory condition of vegetation as specified herein, shall be repaired, reseeded and maintained to meet all requirements as specified herein at the Contractor's expense.

C. After necessary corrective work has been completed, the Construction Manager will certify in writing the final acceptance of the seeded areas.

3.5 WARRANTY

A. The seeded areas shall be accepted at the end of the warranty period if a satisfactory condition exists as defined in this Section.

END OF SECTION

SECTION 02999
MISCELLANEOUS AND SPECIALTY ITEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation of construction fence for the Sediment Basin.

B. Fabrication and installation of caution signs.

C. Installation of ring buoys.

1.2 RELATED SECTIONS

A. Section 01011 - Submittals.

B. Section 01012 - Schedule of Drawings.

C. Section 02100 - Site Preparation.

1.3 REFERENCES

A. State of Ohio, Department of Transportation (ODOT):
   1. Construction and Material Specification, January 1, 1997. Except as supplemented or otherwise modified herein and/or shown on the construction drawings, the entire work under this section shall be in compliance with the provisions of ODOT.

B. Occupational Safety and Health Administration, Code of Federal Regulations (CFR):
   1. 29 CFR 1926.650 Subpart P - Excavations
   2. 29 CFR 1926.106 Working Over or Near Water

1.4 REFERENCE DRAWINGS

See Section 01012 for the Schedule of Drawings.

1.5 DELIVERY STORAGE AND HANDLING

A. Construction fence, signs, and buoys shall be delivered to the site and protected from damage. Damaged items will be removed from the site and replaced at the subcontractor's expense.

1.6 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. Twenty days prior to the start of work, submit for review and approval the following:

1. Traffic cones.
2. Jersey Barricades.
3. Caution signs, drawing to scale including color notations.
4. Buoys.

PART 2 PRODUCTS

2.1 PRODUCTS INCLUDED

A. Caution signs, flat sheet aluminum, 0.063-inch thick, 12-inch minimum dimension in any one direction, yellow reflective sheeting background, black lettering a minimum of one inch in height, all capital letters, standard block lettering. Signs shall read as follows:

CAUTION - DROWNING HAZARD, LIFE VEST REQUIRED WITHIN 5 FEET OF WATER

B. Construction fence for the sediment basin shall be as specified for construction fencing in Section 02100 and will be yellow in color.

C. Buoys and line shall be United States Coast Guard approved, as required by OSHA in 1926.106.

PART 3 EXECUTION

3.1 CONSTRUCTION FENCING

A. Install construction fence along the Sediment Basin as indicated on the Construction Drawings and in accordance with Section 02100.

3.2 CAUTION SIGNS

A. Install caution signs on steel posts at 100 foot intervals (at a minimum per side) along the perimeter of the basin. Steel posts shall be driven and the sign securely bolted to the posts.

3.3 RING BUOYS

A. Provide ring buoys and 90 feet of line at maximum 200 foot intervals around the perimeter of each sediment trap and sediment basin. Ring buoys and line shall be hung on steel posts. The buoys shall be installed at approximately four feet above grade. Inspect each ring buoy for defects or damage. Repair or replace any damaged ring buoys.

3.4 PIPE INSULATION

A. Install pipe insulation at all locations where the existing 24" groundwater line has been exposed as shown on the Construction Drawings.

B. Pipe insulation shall be installed in accordance with the manufacturer's installation instructions.

3.5 GENERAL

A. All signs, construction fence, posts, and ring buoys associated with the retention basin shall remain the property of Construction Manager and shall remain on site.

END OF SECTION

U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

REMEDIATION AREA 1, PHASE II
SITE PREPARATION AND REMEDIATION PACKAGE
TECHNICAL SPECIFICATIONS

Division 3

PARSONS

Prepared by: _____
Date

Checked by: _____
Date

SECTION 03316
CONCRETE REMOVAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavation of all at-and below-grade structures, including:
   1. Floor slabs.
   2. Foundation walls.
   3. Foundations, piers, and footings.
      These concrete structures are primarily located at the STP but also include miscellaneous other at-and below-grade concrete in Area 1, Phase II.

B. Size reduction as necessary to meet IMPP Category 2 requirements.

C. Control of fugitive emissions.

D. These structures are in contact with impacted soils and will be considered as impacted materials as described in Section 02205. Removal of underground utilities (including electric duckbank and manholes) is also covered in Section 02205.

1.2 RELATED SECTIONS

A. Section 02205.

1.3 REFERENCE MATERIALS

A. Technical Reference Document (existing STP facility drawings).

B. Impacted Materials Placement Plan (IMPP) On-Site Disposal Facility, August 1997, Revision H.

C. OU-3 Integrated Remedial Design/Remedial Action Work Plan, May 1997, Revision 0.

1.4 REFERENCES, CODES, AND STANDARDS

All work shall be accomplished in accordance with the following reference, code, and standard requirements.

A. American National Standards Institute (ANSI) standards:

1.	ANSI A10.6-90	Safety Requirements for Demolition Operations.
2.	ANSI A10.9-83	Construction and Demolition Operations - Concrete and Masonry Work - Safety Requirements.

B. National Fire Protection Association (NFPA):

1.	NFPA 241-93	Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.5 SUBMITTALS

A. The Contractor shall submit for approval a concrete removal work plan that contains the following information:
   1. Detailed method and sequence of dismantlement, including equipment to be used.
   2. Methods for control of contaminants, including control of fugitive emissions during cutting activities to control visible dust emissions.
   3. Methods of cutting, including equipment to be used.
   4. Calculations to verify structural adequacy of partially dismantled structure, as applicable.

1.6 QUALITY ASSURANCE

A. Calculations to verify the structural integrity (if applicable) of the partially dismantled structure must bear the stamp of a Registered Professional Engineer.

PART 2 PRODUCTS

2.1 MATERIALS

A. Surfactant used in amended water:
   1. Childers CP-225 CHIL-SORB.
   2. Certech.
   3. Expert Environmental Products.
   4. International Protective Coatings Corporation.

B. The use of explosives is not authorized.

PART 3 EXECUTION

3.1 PREPARATION

A. The Contractor shall ensure that adequate lay down space has been cleared and barriers have been established.

B. Dust control shall be in accordance with Part 6 and the Dust Control Plan. The Contractor shall take the following precautions to control fugitive emissions. A wet dust suppression system shall be used. This system shall use the following:
   a. Amended water (with surfactant).
   b. Finely atomized water spray.

3.2 APPLICATION

A. All dismantlement activities shall be performed in accordance with the references listed in Article 1.4 of this section.
   1. Activities to cut concrete structures outside their own footprint require prior approval.
   2. Activities to cut concrete structures shall maintain the integrity of porous surfaces to the extent practical to minimize dispersal of debris.

B. If concrete dust is a result of removal operations (due to crumbling, etc.), dust suppression techniques must be employed during demolition and, if necessary, during transportation. Dust control shall be in conformance with Part 6 and the Dust Control Plan.

C. The contractor shall prevent damages to adjacent structures, materials, and equipment including underground utilities, during dismantlement activities.

D. All lifting and rigging required shall be in accordance with DOE/ID - 10500, Hoisting and Rigging Manual.

E. Size Reduction.

1. All at-grade and below-grade at the STP area and elsewhere in Area 1, Phase II is to be removed and disposed of in the On-Site Disposal Facility (OSDF).
2. All material destined for the OSDF shall be cut for placement in accordance with the IMPP, including the following guidelines. The physical criteria (dimensions given are considered nominal) that shall be applied to material destined to the OSDF are:
   a. The maximum thickness of concrete or other components of a building slab or substructure shall be 18 inches when the materials are part of a load of similar material.
   b. The maximum thickness of an individual concrete member or other component of a building slab or substructure shall be 4 feet when the item is handled individually and is a regular, rectangular shape having no concrete protrusions greater than 18 inches.
   c. Concrete reinforcement bars shall be cut within a nominal 12 inches of the concrete mass.
3. Embedded steel reinforcing is considered part of concrete.

3.3 LOADING, HAULING TO THE OSDF, AND UNLOADING

All concrete material will be loaded in bulk to the haul vehicles and hauled to the OSDF for disposal according to Section 02205.

END OF SECTION

U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

REMEDIATION AREA 1, PHASE II
SITE PREPARATION AND REMEDIATION PACKAGE
TECHNICAL SPECIFICATIONS

Division 13

PARSONS

Prepared by: _____
Date

Checked by: _____
Date

SECTION 13125
MODULAR RADIOLOGICAL CONTROL FACILITY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. A personnel radiological control facility composed of one nominal 14 feet by 60 feet modular unit combining separate men's and women's locker rooms. Interior ceiling height shall be 8 feet 0 inches minimum. The facility shall consist of a designed and shop fabricated modular trailer unit.

B. Mechanical and electrical requirements. Electrical requirements herein are for modular radiological control facility only. Where these requirements conflict with those of other specification sections, the requirements of this section govern for the modular radiological control facility only.

C. Fire and evacuation alarm system requirements.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 16050 - Basic Electrical Materials and Methods.

D. Section 16170 - Grounding and Bonding.

1.3 REFERENCE DRAWINGS

A. SK-A-04613, Floor Plan (See Attachment A).

B. 44X-5500-E-00210, Radiological Control Unit Facilities, 2-Plex and 4-Plex Electrical Single Line and Grounding (See Attachment B).

C. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. Conform to the OBBC and local building code. Where Hamilton County code requirements vary from the OBBC, the Hamilton County code shall govern.

B. Cooperate with regulatory agency or authority and provide data as requested.

C. National Fire Protection Association (NFPA):
1. NFPA 70 National Electrical Code, 1996 Edition.

2. NFPA 72-93 National Fire Alarm Code.

D. Underwriter's Laboratories, Inc. (UL):
1. Electrical Construction Materials Directory - 96.

E. American Society for Testing and Materials (ASTM):
1. E84 Rev-A-97 Standard Test Method for Surface Burning Characteristics of Building Materials

F. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)

1.5 SYSTEM DESCRIPTION

A. Design Requirements - Structural
1. System and components shall withstand dead loads, live loads, snow load, and wind load calculated in accordance with the Ohio Basic Building Code, OBBC. Design constants shall be as follows:
   a. Ground Snow Load (P_g): 25 psf
   b. Snow Exposure Factor (C_e): 0.7
   c. Importance Factor (I): 1.0
   d. Effective Velocity Pressure (P_e): 20 psf (80 mph basic wind speed, Exposure C)
   e. Floor Live Load: 50 psf

2. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.
3. Assembly shall permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.
4. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

B. Design Requirements - Mechanical
1. Thermal resistance of Wall System: R value of 11 minimum.
2. Thermal Resistance of Roof System: R value of 30 minimum.
3. Thermal Resistance of Floor System: R value of 19 minimum.
4. Heating & Cooling: Air source wall mount heat pump, 48,000 Btu/hr. capacity. The heat pump shall be equipped with supplemental electric resistance heaters, 15 kW @ 480 V, balanced across the 3 phases (5 kW each).
5. Ductwork: Design in accordance with the methods given by the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE). Fabricate in accordance with methods given in the Sheet Metal and Air Conditioning Contractors (SMACNA) Manuals.

C. Design Requirements - Electrical
1. Electrical work shall be designed and installed in accordance with NFPA 70 and drawing 44X-5500-E-00210 (Attachment B).
2. Electrical equipment shall be listed for the purpose specified and indicated according to Underwriter's Laboratories (UL) Electrical Construction Materials Directory.
3. The HVAC shall be 480 V, 3-Phase. The lights and the remaining electrical requirements shall be served from the 208/120 V, 3-Phase, 4-Wire panel.
4. A separate 208/120 V, 3-Phase, 60 Hz panel shall be furnished and mounted outside the trailer in a NEMA 3R enclosure.

5. The panel shall have a 100 amp main breaker minimum.
6. The panels shall be mounted on the same end of the trailer as the HVAC unit.
7. Wire: Use copper insulated wire in electrical circuits. Minimum wire size shall be 12 gauge unless noted otherwise.
8. Conduit: Electrical wiring shall be installed in EMT conduit. Minimum size shall be 1/2-inch conduit. A separate green grounding wire shall be installed. No conduit runs shall be used for equipment grounding.
9. Receptacle circuits shall be rated at 20 amps. Receptacle and light switches shall be labeled identifying the appropriate circuit breaker and shall have fixed labels to identify switched circuits. Provide dedicated circuits for PCMs, fire and evacuation alarm systems.
10. 480 V, 3-Phase equipment shall be wired to a fused safety switch located on the same end of the trailer as the panel. Install fuses sized for the connected load.
11. Exit Signs: Install low energy consumption solid state, LED, exit signs with battery back-up at exits.
12. Emergency Lights: Provide emergency egress lighting with battery back-up to illuminate the paths to exits.
13. A lighting level of 60 footcandles shall be provided at a height of three feet above the floor.
14. Lighting shall be controlled by switches, not breakers.
15. General interior lighting shall be 4 feet 0 inches double tube surface fluorescent (T8) fixtures each with diffusers, electronic ballast and lights. Other interior and exterior lighting shall be incandescent.
16. Provide one 50 watt high pressure sodium light fixture with photo cell and light, outside of each exterior door. Teron Catalog No. CA50 or equal.
17. Telephone: The trailer shall be equipped with a minimum of four telephone outlets. Telephone raceways shall be 3/4 inch EMT conduits. Run conduit from each outlet to central junction box at the front of the trailer. Locate outlets according to attached engineering sketches.

18. Telephone/communication junction boxes shall be located at the same end of the trailer and shall be surface mounted. Exterior junction boxes shall be rated NEMA 3R minimum and shall be mounted with taps to accommodate two-inch conduits.
19. Telephone/communication outlets shall be provided with a blank ivory cover plate for single outlet box (wire and receptacle to be supplied by telephone company, minimum four telephone outlets).
20. Electrical outlet devices shall be ivory with ivory cover plates.
21. Grounding: Trailer frame and metallic sheathing shall be grounded to breaker panel.
22. Provide exterior lighting for the parking lot, install light fixtures on the trailer.

D. Design Requirements - Fire and Evacuation Alarm
1. Fire Alarm System: NFPA 72, manual and automatic local fire alarm system with connections to the central fire alarm equipment.
2. Install fire and evacuation alarm equipment specified herein and indicated on Attachment A. Honeywell, FDF's alarm systems Subcontractor, will make final terminations and perform acceptance testing of the new panel.

1.6 SUBMITTALS

A. Provide submittals as required by Section 01011 and Part 6 of the Contract Documents.

B. Submit complete set of shop drawings within two weeks of Contract award.

C. Indicate recommended location of structural supports.

D. Indicate the number and location of intermediate support columns.

E. Indicate wall and roof system dimensions and general construction details.

F. Indicate number and location of downspouts.

G. Indicate tie-down requirements for wind loads.

H. Product Data: Provide data on mechanical components.

I. Manufacturer's Installation Instructions: Indicate preparation requirements and assembly sequence.

1.7 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with a minimum ten years of experience.

1.8 WARRANTY

A. Provide five-year warranty.

B. Warranty: Include coverage for exterior pre-finished surfaces to cover pre-finished color coat against chipping, cracking or crazing, blistering, peeling, chalking, or fading.

PART 2 PRODUCTS

2.1 MANUFACTURERS - BUILDING SYSTEM

A. Manufactured Structures Corporation, System OBBC.

B. Other acceptable manufacturers offering equivalent systems.

2.2 MATERIALS - MODULAR UNITS

A. Materials - Architectural/Structural
   1. Framing: Steel I beam with cross member outrigger.
   2. Under-floor Bottom Plate: Manufacturer's standard.
   3. Floor Underlayment: 3/4-inch plywood, pressure treated.
   4. Walls: Stud framing with gypsum board interior.

5. Insulation: Batt glass fiber type, faced with reinforced foil.
6. Roofing: Galvanized steel, 30 ga.
7. Ceiling: 1/2-inch vinyl coated gypsum, Group 2 vinyl weight.
8. Exterior Siding: Manufacturer's standard corrugated aluminum.
9. Skirting: Manufacturer's standard corrugated aluminum.
10. Interior Wall Covering: 1/2-inch vinyl coated gypsum, Group 2 vinyl weight.
11. Flooring: Commercial grade sheet vinyl.
12. Doors, Exterior: Hollow Metal type, 36 inches by 80 inches, 16 gauge, insulated, glass side light, door closer, shop primed and finish painted. Keyed lock-set to accept "Best" core.
13. Doors, Interior: Wood solid core, 36 inches by 80 inches, 24-inch square door grill, passage-set.
14. Windows: Manufacturer's standard horizontal slider with insect screen where required by building code. Translucent glass in locker, shower or sink areas.
15. Gutters & Downspouts: Fabricate of same material and finish as siding metal.

B. Materials - HVAC

1. Heat Pump: Wall mounted self-contained air cooled, with hermetic reciprocating compressor, crankcase heater, and pressure service ports on refrigerant piping to evaporator and condenser. Adjustable outside air intake and return air through wall grille with two inch cleanable media filter. Thermostat shall be programmable and located five feet above floor in clean area.
2. Ductwork: Galvanized steel, fabricated and installed per SMACNA. Insulated with two inch fiberglass having vapor barrier. Flexible joint at HVAC unit outlet. Ceiling diffusers shall be white enamel aluminum with adjustable dampers.

C. Materials - Fire and Evacuation Alarm

1. Fire Alarm Circuit Conductors: 18/2 wire; Initiating device insulation color coded red and yellow; Signal device circuit insulation color coded brown and yellow.
2. Wiring (Safety Devices): Fire Alarm Horns/Strobes - 18/2 yellow/brown wire; All Input Zones - 18/2 yellow/red wire; Cable to Building 18P panel - 12 pair, 16/2 - Belden Catalog Number 1072A.
3. Smoke Detectors: Ionization type; Honeywell TC805C or approved equal.
4. Heat Detectors: Combination rate-of-rise and fixed temperature; Honeywell T4057A (135 degrees F setting and 15 degrees F per minute rate-of-rise) or approved equal.
5. Manual Pull Stations: Honeywell S464A or approved equal.
6. Horn with Strobe: Flush/Surface mounted, audio/visual type with strobe; Honeywell SC716B1001 or approved equal.
7. End of Line Resistors: 1.9 K ohms.
8. Motorola Monitor II Pager with charger amplifier: Motorola's HOYUMC3112, HOYUMC3122, and NLN3039A or approved equal.
9. Fire Alarm Panel: Provide Honeywell LE Card, Catalog Number 14505128-002 for FS 90 panel in Building 18P.
10. Lightning Protectors shall be used on fire alarm branch circuits or evacuation branch circuits only when entering Building 18P.

E. Materials - Accessories

1. Lockers: Enamel finish sheet steel, double tier type, 12 inches wide by 15 inches deep by 72 inches high.
2. Fire Extinguisher: 10 lb. capacity, ABC type, one mounted at each exit door.
3. Tables (2 required.): Metal frame with metal legs, 24 inches by 48 inches, laminated plastic, "Formica" or hardboard top.
4. Chairs (4 required.): Metal frame, stackable type.

5. Anti-C Storage Cabinets: Minimum 22 gauge metal with enamel finish, 36 inches wide by 18 inches deep by 72 inches high, 5 or 6 shelves.
6. Locker Room Benches: Lengths as indicated on Drawings. Benches anchored to floor.
7. Coat & Hat Wall Hooks (Four units per monitoring room): Horizontal type, chrome plated steel, with 6 each double hooks per 36 inches long unit.
8. PCMs: Furnished by FDF.
9. Friskers: Furnished by FDF.
10. Card Readers: Furnished by FDF.
11. Hand & Foot Monitors: Furnished by FDF.
12. Waste Drums: Furnished by FDF.
13. Stairs with hand railings shall be provided at entrances/exits from the trailers. The landings shall be level and at the same elevation as the doorways. Steps shall be a minimum 44 inches long with a minimum tread depth of 11 inches. The stair landings and steps shall have permanent, non-skid walking surfaces and shall be securely arranged to resist movement.

2.3 FINISHES

A. Framing Members: Clean, prepare, and coat with black asphalt undercoating, 3 mil minimum thickness.

B. Exterior Surfaces of Wall Components and Accessories: Precoated enamel on aluminum, color as selected from manufacturer's standard range.

C. Vinyl Sheet Flooring: Color and pattern as selected from flooring manufacturer's standard range.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install the modular radiological control facility trailer ready for use when first needed to avoid delays in the work.

B. Install the modular radiological control facility trailer at the designated location indicated on the plans. Set and level the trailer on concrete block piers in accordance with the trailer manufacturer's requirements. Anchor the trailer to prevent rollover, slipping, etc. during high winds. Set and level stairs and landings to minimize tripping hazards. Provide locking entrances to prevent unauthorized entry.

C. Equipment connections and other necessary work within new Data Gathering Panel (DGP) shall be coordinated with FDF's fire alarm service company (Honeywell) at the direction of the Construction Manager. Contractor shall arrange and pay for the services of the fire alarm service company for performing necessary DGP work. Connect fire alarm equipment to Building 18P FS-90 panel via 12 pair cable routed from junction box on exterior of facility.

D. Use 18 AWG minimum size conductors for fire alarm detection and signal circuit conductors. Install wiring in EMT conduit, according to article 760 of NFPA 70.

E. Check that fire alarm detection end-of-lines device are with last device or in a separate box adjacent to last device in circuit.

F. Connect four pairs (copper conductors) from the new phone service to FS 90 in Building 18P.

3.2 FIELD QUALITY CONTROL

A. Test fire and evacuation alarm system in accordance with NFPA 72H and local fire department requirements. Tests will be witnessed by the Construction Manager and FDF Fire Protection. Demonstrate normal and abnormal modes of operation, and required responses to each.

3.3 UTILITIES/SERVICING

A. Install temporary utility services or make connections to existing services provided by FDF.

3.4 TERMINATION/RELEASE

A. At completion of site activities, restore trailer and contents to prework conditions. Housekeeping and repairs/replacements shall be done to the satisfaction of the Construction Manager. When authorized by the Construction Manager, release the modular radiological control facility to FDF, including office equipment and interior components.

END OF SECTION

ATTACHMENT A

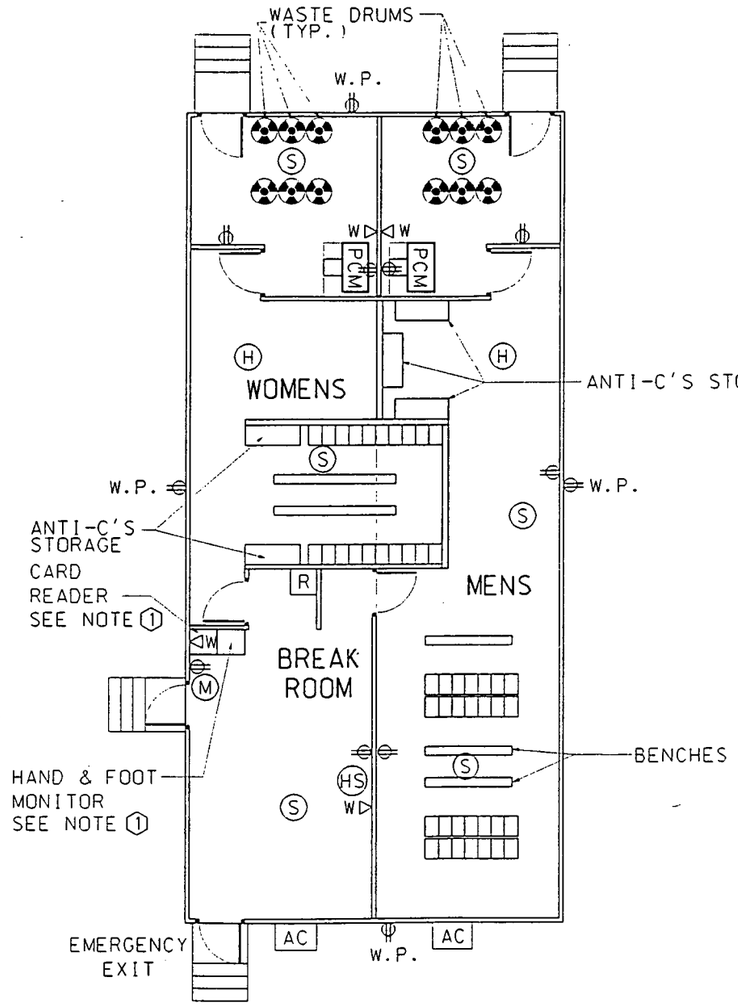
SKETCH SK-A-04613

Date: 11/4/97 13125 WBS No: 1.1.1.1.1.5
Rev.: B RE: OC SCEP/175/A1PII

PRELIMINARY
NOT FOR CONSTRUCTION

STATE OF OHIO NORTH (NAD 83)
FEMP NORTH ∠=1.5672°

RADIOLOGICAL CONTROL POINT FACILITY



FLOOR PLAN

NOTES

1. CARD READER AND HAND & FOOT MONITOR (FDF PROVIDED)

LEGEND

- WASTE DRUMS (FDF PROVIDED)
- LOCKERS: DOUBLE 12"W×18"D×72"H
- PCM — PERSONNEL CONTAMINATION MONITOR (FDF PROVIDED)
- W ▽ — PHONE LOCATIONS (2 REQ'D.)
- W.P. — EXTERIOR WEATHER PROOF RECEPTICAL LOCATIONS (2 REQ'D.)
- DUPLEX RECEPTICAL LOCATIONS (5 REQ'D.)
- (S) SMOKE DETECTOR
- (H) HEAT DETECTOR
- (M) MANUAL PULL STATION
- (HS) HORN STROBE
- [R] RAPID RECEIVER FOR EVACUATION SYSTEM

SCALE
0 10 20 FEET

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE		
C	ISSUED FOR 90% EPA DESIGN REVIEW			
B	ISSUED FOR 90% FDF AND DOE DESIGN REVIEW	SG 11/04/97	CS 11/04/97	OWC 11/04/97
A	ISSUED FOR INTERIM DESIGN REVIEW	SG 10/31/97	CS 10/31/97	OWC 10/31/97

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
REMEDIATION
AREA 1, PHASE II

DRAWING TITLE
ARCHITECTURAL
PLAN
RADIOLOGICAL CONTROL POINT FACILITY

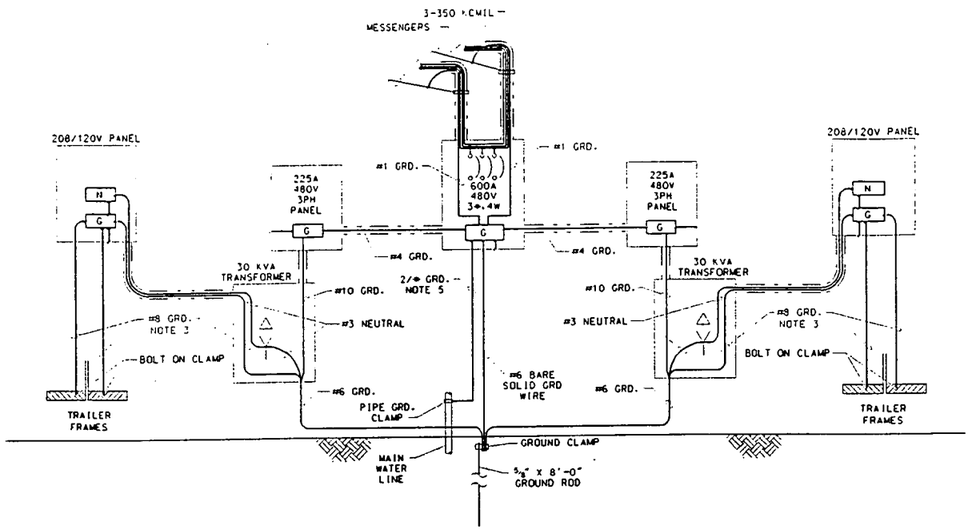
DRAWN BY	DATE	TECHNICAL LEAD	DATE	CHECKED BY	DATE
O.L.LEGASPI	10-06-97	S. GHANTOUS		S. GHANTOUS	10/11/97
PLANT/BLDG NO.		FLOOR		SCALE: NONE	CLASS

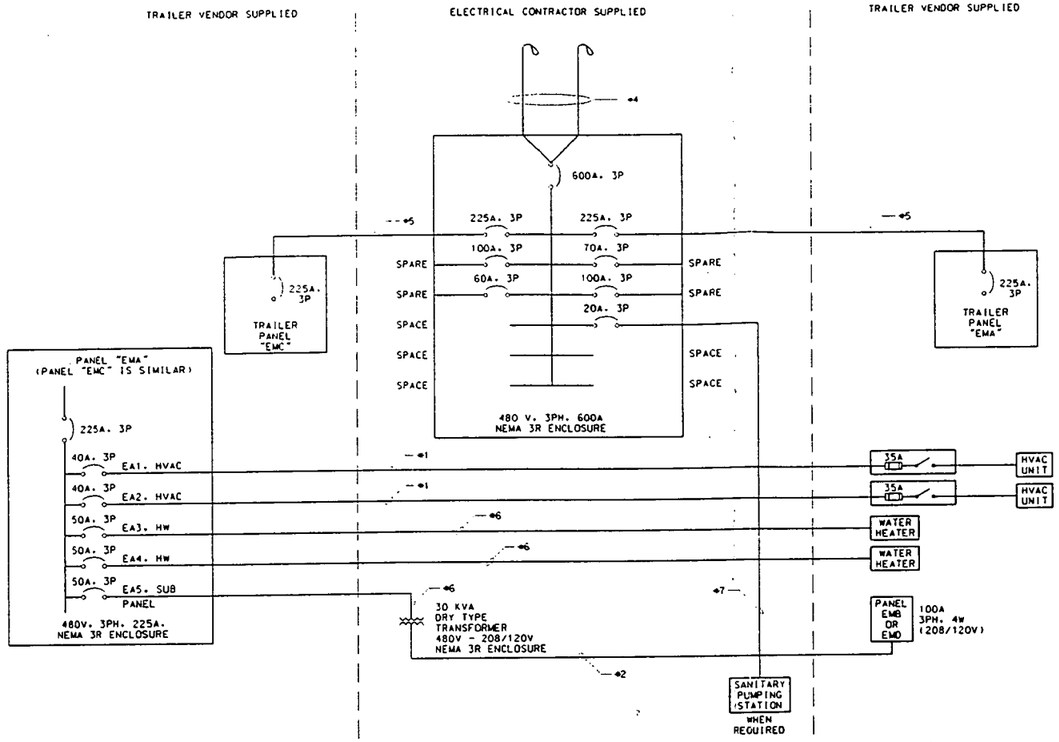
SUBMITTED FOR 30% ISSUE	SUBMITTED FOR 60% ISSUE	SUBMITTED FOR 90% ISSUE
TECH LEAD	TECH LEAD	TECH LEAD
DATE	DATE	DATE

PO NUMBER	FOR PROJECT NO.	DRAWING INDEX CODE NO.	SHEET NO.	REV. NO.
P0175	WBS 1.1.1.1.5 00-90701	SK-A-04613	A0001	C

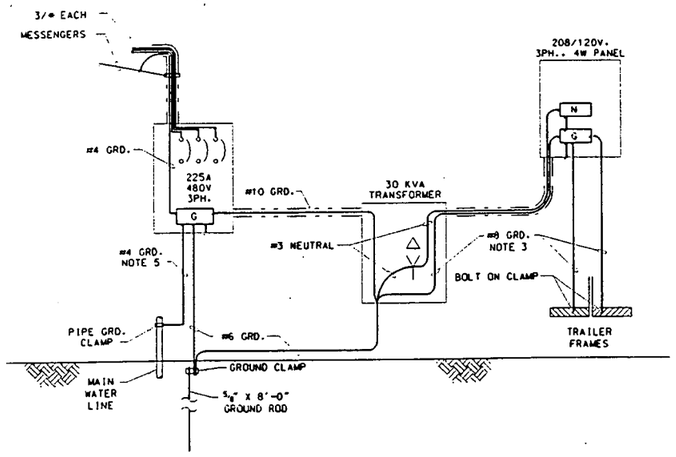
ATTACHMENT B

DRAWING 44X-5500-E-00210

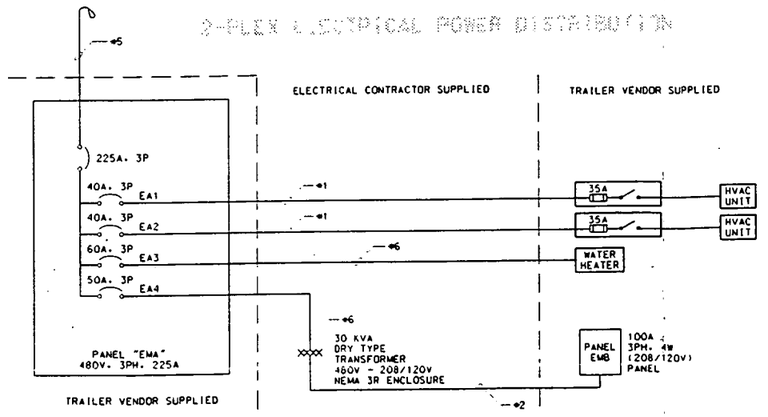




2-PLEX TRAILER GROUNDING



2-PLEX & 4-PLEX TYPICAL POWER DISTRIBUTION



NOTES

1. ALL WIRING TO BE COPPER WITH THWN INSULATION UNLESS NOTED.
2. ALL GROUND WIRE IS TO BE COPPER.
3. TRAILER VENDER TO INSTALL
4. USE SEALTIGHT CONDUIT WHERE REQUIRED
5. REQUIRED WHEN WATER LINE IS METAL

Φ1 = 3-#8 AND 1-#10 GRD. 3/4"C
Φ2 = 4-#3 AND 1-#8 GRD. 1 1/4"C
Φ3 = 3-#4 AND 1-#8 GRD. 1 1/4"C
Φ4 = 2-3" CONDUITS EACH WITH 3-350 KCMIL AND 1-#1GRD
Φ5 = 3-3/Φ AND 1-#4 GRD. 2"C
Φ6 = 3-#6 AND 1-#10 GRD.. 3/4" C
Φ7 = 3-#12 AND 1-#12 GRD.. 3/4" C

NO.	REVISIONS	DATE	DWN. BY	APPD.
1	REDESIGN FOR AS-BUILT	10-28-94	MET	
0	CFC	3-24-94	MEL	GEP

NO.	REVISIONS	DATE	DWN. BY	APPD.

REF. DWG. NO.

NOTE: FERMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY

PERFORMANCE GRADE : 2 3 4 5
BY: DATE:

APPROVALS					
			SAFETY ENG.		3-23-94
CIVIL & STR.			MAINTENANCE		
ELECTRICAL			Q.A.		3-23-94
ENGINEER	R.C. WORSLEY	3-23-94	FIRE PROTECT.		3-23-94
INSTRUMENT			WASTE MANAGE		
MECHANICAL			SECURITY		
CM		3-23-94	CRU3 ENG		3-23-94
CHECKED	GEP		RAD ENG		3-23-94
APPROVED	G.E. PAUL	3-24-94			

FERNALD ENVIRONMENTAL RESTORATION MANAGEMENT CORPORATION
FERMCO
Fernald
Environmental Management Project
U.S. DEPARTMENT OF ENERGY

PRODUCTION AREA: TRAILERS

RADIOLOGICAL CONTROL UNIT FACILITIES
2-PLEX AND 4-PLEX
ELEC SINGLE LINE AND GROUNDING

RES 2287	44X-5500-E-00210 | 1
DATE 3-3-94	
DRAWN ME LOHRE	

FILE NAME: /res/res2287/44xe0210.dgn

FORMAT REVISED 8/7/95

SECTION 13205
TANKS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flexible fabric storage tanks (TNK-1, -2, -3, -4).

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. Shop drawings, design data, product inspection and test data specially prepared for the project.

C. Manufacturer's installation and maintenance instructions.

D. Material testing and construction inspection program.

1.5 DELIVERY AND HANDLING

A. Store tank in a clean, dry place and protect from weather. Provide protection from weather and from damage during transit.

B. Loose items shall be tagged and delivered in a standard commercial package. The package shall be protected from the weather, climate conditions including temperature and humidity variations, dirt and dust, and other contaminants.

C. The Construction Manager's acceptance of the installed tank will be contingent upon satisfactory inspection and testing at the job site.

PART 2 PRODUCTS

2.1 TANK

A. Refer to Attachment A for design data.

B. Groundwater to be stored in tanks may contain VOC up to 380 PPB max. (including PCE up to 100 PPB max.) plus trace amounts of uranium (in PPB).

C. Manufacturer: Aero Tec Laboratories, Inc., Bell Avon, Inc. or equivalent.

D. Water for testing is available from OSDF/A1PII Water Well. Coordinate with Construction Manager for access.

2.2 FABRICATION

A. Tank shall be completely shop fabricated and tested.

PART 3 EXECUTION

3.1 ERECTION/INSTALLATION/APPLICATION

A. The installation of the tank shall be in accordance with the manufacturer's instructions.

B. The Contractor shall completely install the tank and accessories in the location shown, furnishing all items required.

3.2 QUALITY CONTROL

A. The tank shall be visually inspected by the Contractor upon delivery to ensure that no damage has occurred during shipping.

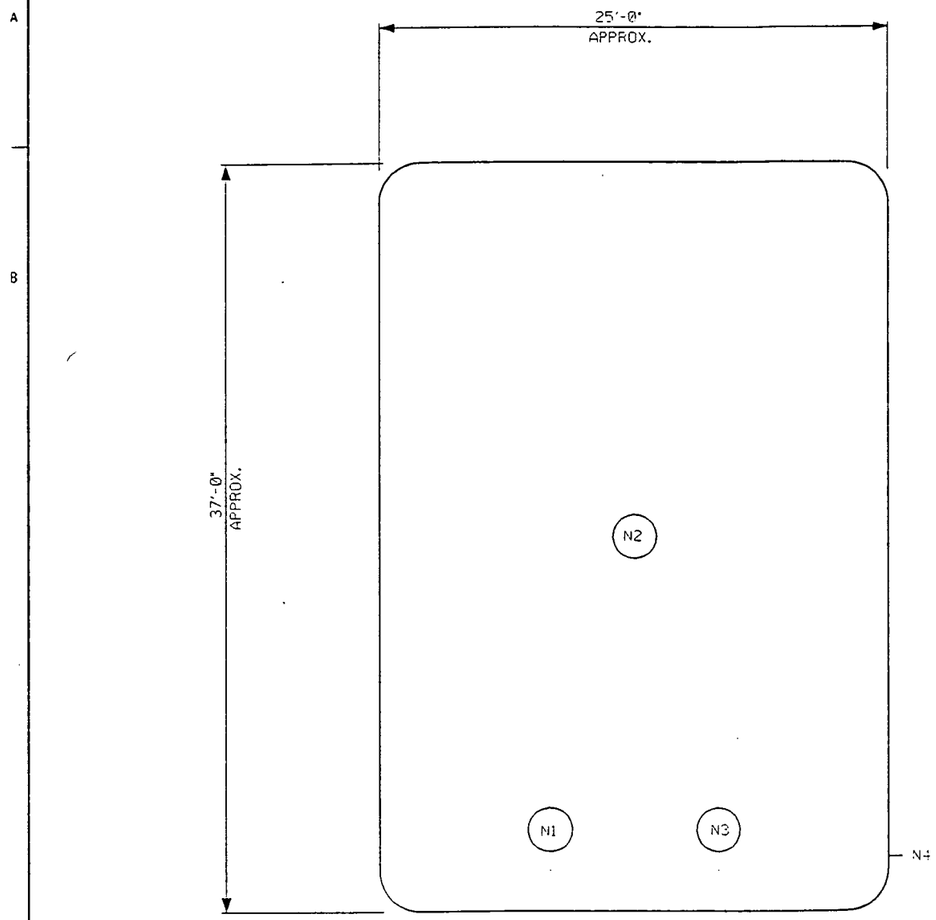
B. The tank shall be tested by filling with clean water and inspecting for leaks after the tank has been standing full for at least 1 hour. Any leakage will be cause for rejection. Leaks shall be corrected and the tank retested. Dispose of test water as directed by the Construction Manager.

C. The Contractor shall notify the Construction Manager of testing/inspection activities prior to the start of all field tests or inspections.

END OF SECTION

ATTACHMENT A

TANK DATA SHEET



PLAN

TANK DATA

GENERAL

1. CODES AND STANDARDS: _____
2. NOMINAL CAPACITY: 25,000 GAL
3. SERVICE: GROUNDWATER

DESIGN DATA

1. FLUID TEMPERATURE: MAX AMBIENT °F. MIN AMBIENT °F
2. AMBIENT TEMPERATURE: MAX 95 °F. MIN -10 °F
3. INTERNAL PRESSURE: DESIGN ATM PSIG. OPERATING — PSIG
4. SPECIFIC GRAVITY OF PROCESS FLUID: 1.0 AT 60 °F
5. CORROSION ALLOWANCE: SHELL N/A IN. ROOF N/A IN
   BOTTOM N/A IN. STRUCTURAL N/A IN
6. FOUNDATION TYPE: N/A
7. WIND: IMPORTANCE FACTOR - TABLE — EXPOSURE -
   BASIC WIND SPEED -
8. SNOW LOAD - PSF. ROOF LIVE LOAD: - PSF:
9. SEISMIC: _____

FABRICATION

1. ROOF TYPE: N/A ROOF JOINT TYPE: N/A
2. BOTTOM TYPE: N/A BOTTOM TYPE JOINT: N/A
3. PAINTING: EXTERIOR N/A
4. COATING: INTERIOR N/A
5. INSULATION: NONE
6. MATERIAL: PLATE NOTE 1 . FORGING CS
   PIPE AND TUBE CS . GASKETS _____
   BOLTING _____

INSPECTION AND TEST

PER SPEC

NOTES:

1. TANK MATERIAL SHALL BE INDUSTRIAL DUTY ELASTOMER COATED FABRIC SUITABLE FOR OUTDOOR INSTALLATION. 30 MIL MINIMUM THICKNESS.
2. MANUFACTURER'S STANDARD VENT.

NOZZLE AND ACCESS WAY SCHEDULE

MARK	SIZE	CLASS	TYPE	SERVICE	REMARKS
N1	6"		NPT	INLET	
N2	6"		NPT	VENT	NOTE2
N3	6"		NPT	OUTLET	
N4	2"		NPT	DRAIN	

PARSONS ERA PROJECT

PROJECT NAME REMEDIATION AREA1, PHASE II

WBS 1.1.1.1.1.5

TITLE

MECHANICAL PROCESS
TANK DATA SHEET
RECEIVING TANK (TNK-1.-2-3.&-4)

SPECIFICATION NO.	DRAWING INDEX CODE NO.	SHEET NO.
13205 ATTACHMENT A	SCEP/P0175	1 OF 1

SKETCH NO.	REV NO.
SK-M-04596	C

SECTION 13400
INSTRUMENTS AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. INSTRUMENTATION PRODUCTS/EQUIPMENT:
   1. Pressure gauge.
   2. Magnetic Flowmeter.
   3. Control Valve.
   4. Float Switch.
   5. Analog Switch.

B. Refer to the Instrument Data Sheets, Attachment A.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 13405 -Installation and Calibration of Instruments.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES, CODES, AND STANDARDS

A. American Society of Mechanical Engineers (ASME):
   1. ASME B16.5-88/ B16.5A-92 Pipe Flanges and Flanged Fittings.

B. American Society for Testing and Materials (ASTM):
   1. ASTM A105/A105M-96 Standard Specification for Carbon Steel Forgings for Piping Applications.

C. National Fire Protection Association (NFPA):
   1. NFPA 70-96 National Electrical Code, 1996 Edition.

D. National Electric Manufacturing Association (NEMA):
   1. NEMA ICS 6-93 Enclosures for Industrial Control and Systems; Revision 1 - March 1989.

E. National Institute of Standards and Technology (NIST).

1.5 SYSTEM DESCRIPTION

A. General Design Requirements: For description of instrumentation equipment and detailed design requirements, reference Attachment A.
   1. Contact closure outputs shall be "dry" contacts isolated from ground.
   2. Instruments and control devices which require external power shall accept 120 volts, 60 Hz as the power source.

B. General Performance Requirements
   1. For detailed performance requirements for all instrumentation for this design package, reference Attachment A.
   2. All instruments shall be accurate to the tolerance levels specified in Attachment A and shall maintain these tolerance levels under project conditions as described in Article 1.9.
   3. Instrumentation shall perform to the stated requirements whether stationary or mobile, and require minimal calibration if remounted or moved.

1.6 SUBMITTALS

A. Provide submittals as required per Section 01011.

B. Product Data: Include catalog "cut sheets," data sheets, and flow characteristic curves with bid.

C. Shop Drawings: Include assembly drawings and wiring diagrams with shipment.

D. Installation instructions, including recommended calibration procedures and installation details, with shipment.
   1. Include frequency of calibration required at the time after system installation and regular intervals of time thereafter.
   2. Certification of test equipment (calibration records) used to complete the work as described herein.

E. Test reports: Test reports shall be typewritten, listing equipment used, person or persons performing the tests, date tested, device or circuit tested, and results of test; to be included with shipment.

F. Calibration reports, with shipment.

G. Operation and Maintenance (O&M) manuals, with shipment.

H. Suggested spare parts inventory for each type of instrument, with bid.

1.7 QUALITY ASSURANCE

A. Instrumentation equipment shall be new, industrial type, of the function and type specified in Part 2.

B. Compatibility and Calibration: Instrumentation equipment provided shall be compatible with intended service.
   1. Instrument equipment shall be calibrated to manufacturer's standards.
   2. Test equipment shall be calibrated and shall be traceable by tag number, make, and model number to the instrument certified by the NIST.

C. Manufacturers' Qualifications: Manufacturers shall have 5 years of verifiable experience in the production of instrumentation equipment of the same type and similar performance as that specified herein.

D. Instrument equipment shall be calibrated as specified and commissioned in accordance with Section 13405.

1.8 DELIVERY, STORAGE, HANDLING, AND SHIPPING

A. Packing and Shipping

1. Product shipping container(s) shall contain packing materials to prevent the entrance of water to instrument surfaces, interior, and exterior.
2. Product shipping container(s) shall be clearly marked "FRAGILE - DO NOT DROP," and shall be furnished with an itemized invoice stating the contents and quantity of products contained therein.
3. Ports for process, electrical, and/or pneumatic connections shall be plugged to prevent the interior accumulation of dirt and moisture.
4. Ensure that closures used for covering, wrapping, or plugging openings shall not be made of polyvinyl chloride (PVC) or other plastics that contain chlorides.
5. Control components assembled prior to shipment shall be packaged to minimize entry of dirt and moisture.

B. Acceptance at the FEMP

1. Products arriving at the FEMP shall be examined for general damage during shipping. Those products found to be damaged shall not be accepted at the FEMP.

C. Storage and Protection

1. Instrumentation equipment shall be stored according to manufacturer's requirements for storage, if information regarding storage is provided by the manufacturer. In cases where specific storage requirements are not provided, equipment shall be stored in a clean, dry area protected from the weather until required for installation.

1.9 PROJECT CONDITIONS

A. Services

1. Operating Hours: 24 hours/day, 7 days/week, 52 weeks/year.
2. Industrial design with a minimum instrument life of 5 years.

B. Ambient Conditions

1. Plant Location: Fernald, Ohio.
2. Plant Elevation: Approximately 580 feet above sea level.
3. Ambient Temperature Range: -10 to 100 degrees F.
4. Barometric Pressure, inches Hg absolute (mean at 70 degrees F): 29.4.
5. Relative Humidity: Varies from 20 percent to 95 percent.

C. Electrical Supply: 120 volts, single phase, 60 Hz.

1.10 SEQUENCING AND SCHEDULING

A. The sequencing of work and scheduling of tasks shall follow the project schedule and milestones approved by the Construction Manager. Acquisition/delivery of instrumentation and controls shall adhere to and support the approved project schedule.

1.11 WARRANTY

A. Special Warranty
   1. No special warranty requirements apply.

1.12 MAINTENANCE

A. Maintenance Service
   1. Preventive/scheduled maintenance shall be performed per the manufacturer's instructions. Maintenance service numbers and information shall be provided along with product documentation sent in shipping. Maintenance policies and procedures shall be fully described in the maintenance documentation.

B. Extra Materials
   1. Any extra/replacement parts or materials required to maintain acceptable product performance levels shall be referenced in the product documentation provided with shipping.

PART 2 PRODUCTS

2.1 PRODUCTS/EQUIPMENT

A. Pressure Gauge (See Attachment A, Sheet 1)
   1. Pressure element shall be bourdon tube or diaphragm. Elements in contact with the process shall be manufactured from material suitable for specific process application.
   2. Gauge shall have a 4-1/2-inch dial, 1/2-inch threaded connection.
   3. All gauges shall be liquid filled to help dampen vibration to the gauge needle.
   4. Snubbers shall be used on the discharge side of all centrifugal pumps.
   5. Scale shall be selected so that normal operating range is between 33 percent and 67 percent of span.
   6. Manufacturers: Dwyer, McDaniel, or Noshok.

B. Magnetic Flowmeter (see Attachment A, Sheet 2)

1. Magnetic flowmeter shall comply with the following performance requirements:
   a. Rangeability shall be 10 to 1, minimum.
   b. Response time shall be adjustable to 10 seconds.
2. Microprocessor based signal converter shall capable of flow totalization, and complete with DPDT relay output. The flow indicating totalizer shall be a digital display of at least six digits, 0 through 9. Scale shall be in gallons, or multiplied by a power of ten, as required by operations.
3. Converter accuracy shall be as stated on the data sheet provided in Attachment A.
4. Magnetic flowmeter shall be complete with grounding rings and empty pipe detector.
5. Manufacturers: Fisher/Rosemount, Bailey/Fischer and Porter or Foxboro.

C. Control Valves (see Attachment A, Sheets 3 and 4)

1. Construction:
   a. Bonnet bolting shall be manufacturer's standard for specified service. Threaded surfaces shall be coated with molybdenum disulfide except those in contact with process fluid.
   b. Control valves shall be provided with a manual operator.
   c. Manufacturer: Fisher, Masoneilan, or Neles-Jamesbury.
2. Electric Actuator:
   a. Electric actuators shall accept an open and close input contact signal as the control signal input.
   b. In closing direction, flow valve shall seat before actuator reaches travel limit.
   c. In opening direction, actuator shall engage a stop before actuator reaches its travel limit.

d. Actuator materials shall be standard, unless otherwise specified, with spring treated to resist corrosion.
e. Actuator assembly shall be sized to provide force required to ensure total closure to ensure standard leakage rates when differential pressure in flow valve body is at maximum differential pressure.
f. Available power for electronic actuators will be 120 VAC, 60 Hz.
g. Manufacturers: Keystone, Worcester, or Neles-Jamesbury.

D. Float Switches (see Attachment A, Sheet 5)
1. Float (or displacer) type level switches will be required to sense high level in tanks.
a. Top mounted float switch assembly, float diameter not to exceed 1-1/4 inch.
b. SPST output contacts, rated 20 VA, 120 VAC, single setpoint.
c. Manufacturers: Magnetrol, Gems, SOR, Inc.

E. Analog Switch will be required to receive a 4-20 mA DC signal from flow transmitter to detect low flow and stop the Transfer Pumps.
1. Socket mounted 4-20 mA DC switch with DPDT relay contacts rated 5A at 115 VAC.
2. Manufacturers: Action Instruments, Acromag, Precision Digital.

2.2 MATERIALS

A. See data sheets, Attachment A.

2.3 LABELING

A. Instrument Tagging:
   1. Instruments requiring identification shall be tagged accordingly with a stainless steel 1-inch by 2-1/2 inch by 1/16-inch-thick tag (minimum). Lettering shall be minimum 1/4 inch high and stamped so that it can be easily read and identified.
   2. Tags shall be secured to the instruments by a beaded stainless steel chain so that they will remain on the instrument.

PART 3 EXECUTION

3.1 CLEANING

A. Instruments shall be cleaned in accordance with the manufacturer's recommended cleaning procedures.

B. After cleaning, work shall be free from contamination in accordance with the following:
   1. No residual contaminants present that could cause the instrument to become inoperative.
   2. No residual moisture present.
   3. No corrosion products, such as rust, present.

3.2 ATTACHMENTS

A. The following Instrument Data Sheets are attached:

1.	Pressure Gauge	1
2.	Magnetic Flowmeter	2
3.	Control Valve	3 through 4
4.	Float Switch	5 through 6
5.	Analog Switch	7

END OF SECTION

ATTACHMENT A

INSTRUMENT DATA SHEETS

REQUISITION NO.	VENDOR
Reference Specification Sheet No. NOTES APPLY TO ALL GAUGES	Model No.

1	Type:	X	Indicating	___	Receiver			
		___	Other					
2	Mounting:	___	Surface	X	Local	___	Flush	
3	Dial Diameter: 4 1/2 inches							
4	Dial Color:	___	Black	X	White w/ Black Markings			
5	Case Material:	___	Cast Iron	___	Aluminum	X	Phenol	
6	Ring Material:	X	Screwed	___	Hinged	___	Slip	
7	Case Fill:	___	Liquid Filled	X	Glycerine Filled			
		___	Other					

8	Pressure Element:	X	Bourdon	___	Bellows			
		___	Other					
9	Element Material:	___		___	Steel			
	Type: Bronze	___	Stain. Steel	___	Other			
10	Socket Material:	X	Bronze	___	Steel			
	Type:	___	Stain. Steel	___	Other			
11	Connection:	___	1/4 - in.	X	1/2 - in.			
	(NPT)	X	Bottom	___	Back			
12	Movement:	X	Bronze	___	Stain. Steel			
		___	Nylon	___	Other			
13	Blowout Disk	X	Yes	___	No			

Rev	Tag No.	Item No.	P & ID No. and Section	Range (psig) Tube	Range (psig) Dial	Operating Pressure	Service	Remarks
	PI102		N-00465		0-30	13 PSIG	TRANSFER PUMP DISCHARGE PRESSURE	NOTES 1-4
	PI103		N-00465		NOTE 5		XFER PMP SUCTION STRAINER INLET	NOTES 1-3
	PI104		N-00465		NOTE 5		XFER PMP SUCTION STRAINER OUTLET	NOTES 1-3

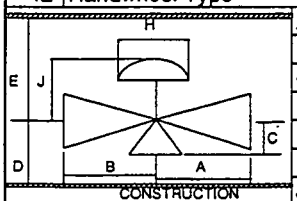
NOTES:
1. LENS SHALL BE POLYCARBONATE.
2. MAXIMUM TEMPERATURE: 120 DEG F.
3. ACCURACY SHALL BE +/- 2% OF FULL SCALE.
4. PROVIDE WITH BRASS PRESSURE SNUBBER AND 1/2" MNPT BOTTOM CONNECTION.
5. DIAL RANGE: (-)30" Hg - 15 PSIG.

PARSONS ERA PROJECT		Sheet	Job No.
INSTRUMENT DATA SHEET	PRESSURE GAUGES	1	SECP / PO175
WBS 1.1.1.1.5		Document Number 13400-ATTACHMENT A	Rev C

	REQUISITION NO.			VENDOR					
1	Loop Tag No.			FIT/FQ010					
2	Item No.								
3	Model No.			*					
4	Service			TRANSFER PUMP FLOW					
5	Line No.			ST-8"-A-7010					
6	P&ID No./Section			92X-5900-N-00465					
	SERVICE CONDITIONS								
7	Fluid			NOTE 5					
8	Normal Flow (units)			1000 GPM					
9	Flow (units)	Max.	Min.	1000 GPM	100 GPM				
10	Temperature (units)	Max.	Min.	80 °F	50 °F				
11	Pressure (units)	Max.	Min.	40 Ft WTR	0 Psig				
12	Velocity (units)	Max.	Min.	11.1 FPS	1.1 FPS				
13	Conductivity (µMHOS/c)	Norm.	Min.	NOTE 5					
14	Specific Gravity	Max.	Norm.	1	1				
15	% Solids	Max.	Norm.	NOTE 5					
16	Extra Conditions or Requirements			NO					
	MEASURING ELEMENT			FE010					
17	Tube Size (units) Matl. Sched.			6"	*				
18	Liner Material			TEFLON PFA					
19	End Connections & Rating / Type Material			ANSI 150 WAFER					
20	Electrode Material			316L STAINLESS STEEL					
21	Meter Casing			*					
22	Power Requirements / Electrical Code			120V, 60HZ	GENERAL				
23	Enclosure Class			NEMA 4					
24	Grounding Type / Material			GROUNDING RINGS	316L SST				
25	Ultrasonic Cleaning			NO					
26	Extra Features or Requirements			NO					
	TRANSMITTER			FIT/FQ010					
27	Output Signal (units)			4-20 mA (NOTE 6)					
28	Calibrated Flow Range (units)			0-1500 GPM					
29	Conduit Conn. Size (units)			1/2" FNPT					
30	Mounting			INTEGRAL					
31	Enclosure Class			NEMA 4					
32	Signal Cable Length (units)			*					
33	Power Requirement / Elect. Code			120V, 60HZ	GENERAL				
34	Integrator			YES					
35	Zero Return			YES					
36	Alarms			*					
37	Special Modification			NO					
38	Extra Features or Requirements			NOTES 2, 3 & 4					

Notes:

1. "*" INFORMATION AND OR DATA TO BE FURNISHED BY VENDOR.
2. ACCURACY SHALL BE AS A MINIMUM 1.0% AND REPEATABILITY SHALL BE 0.5% OR BETTER.
3. FLOWMETER SHALL INCLUDE EMPTY PIPE DETECTOR.
4. CONVERTER SHALL USE MICROPROCESSOR-BASED TECHNOLOGY AND INCLUDE DIGITAL INDICATOR.
5. LIQUID IS GROUNDWATER / RAINWATER WITH SUSPENDED SOLIDS.
6. LOOP POWER TO BE SUPPLIED IN TRANSMITTER.

	REQUISITION NO.		VENDOR					
1	Tag No.		FV001		FV002		FV003	
2	Item No.							
3	Model No.		*		*		*	
4	Service		RECEIVING TANK 1 INLET		RECEIVING TANK 2 INLET		RECEIVING TANK 3 INLET	
5	Line No.		ST-6"-A-7002		ST-6"-A-7001		ST-6"-A-7003	
6	P&ID No.		92X-5900-N-00465		92X-5900-N-00465		92X-5900-N-00465	
	SERVICE CONDITIONS							
7	Fluid	Units	WATER	GPM	WATER	GPM	WATER	GPM
8	Min Flow	Max Flow	100 GPM	800 GPM	100 GPM	800 GPM	100 GPM	800 GPM
9	Normal Flow	Sizing Flow						
10	Inlet Press Max	Norm	50 PSIG		50 PSIG		50 PSIG	
11	dP Max	dP - Valve Sizing	50 PSIG		50 PSIG		50 PSIG	
12	Temp Max °F	Norm °F	80	50	80	50	80	50
13	sp gr @ 60 °F	@ Opr Temp	1	1	1	1	1	1
14	Viscosity @ Opr Temp cp		NOTE 5		NOTE 5		NOTE 5	
	BODY							
15	Body Size	Port Size	6"	N/A	6"	N/A	6"	N/A
16	Type of Body		BUTTERFLY VALVE		BUTTERFLY VALVE		BUTTERFLY VALVE	
17	Material		CARBON STEEL		CARBON STEEL		CARBON STEEL	
18	End Connections		CLASS 150 WAFER		CLASS 150 WAFER		CLASS 150 WAFER	
19	Bonnet		N/A		N/A		N/A	
20	Lubricator	Isolating Valve	NO	NO	NO	NO	NO	NO
21	Packing or Seal		BUNA-N OR NITRILE		BUNA-N OR NITRILE		BUNA-N OR NITRILE	
22	Position Indicator		NO		NO		NO	
23	Guiding		N/A		N/A		N/A	
24	No. of Ports		1		1		1	
25	Valve Characteristic		LINEAR		LINEAR		LINEAR	
26	Cage		NO		NO		NO	
27	Plug (Disc)		304 SST		304 SST		304 SST	
28	Seat		TFE		TFE		TFE	
29								
30	Cv for Sizing Flow	Furn Cv	*	*	*	*	*	*
	NOISE DATA							
31	Line Size	Port Schedule	6"		6"		6"	
32	Insulation							
33	Sound Pressure Level dBA		85 (MAX)		85 (MAX)		85 (MAX)	
	ACTUATOR AND ACCESSORIES							
34	Actuator Type		MOTORIZED (NOTE 2 & 3)		MOTORIZED (NOTE 2 & 3)		MOTORIZED (NOTE 2 & 3)	
35	Fail Position		LAST POSITION		LAST POSITION		LAST POSITION	
36	Close @	Open @	NOTE 4	NOTE 4	NOTE 4	NOTE 4	NOTE 4	NOTE 4
37	dP For Actuator Sizing		50 PSIG		50 PSIG		50 PSIG	
38	Positioner Required	w/ Filter Rgltr	NO	NO	NO	NO	NO	NO
39	Bypass	Gauges	NO	NO	NO	NO	NO	NO
40	For Input Signal of							
41	Output Shall Be							
42	Handwheel Type		MFR. STD.		MFR. STD.		MFR. STD.	
		A. Face to Face	*		*		*	
		B. Face to Center	*		*		*	
		C. Face to Center	*		*		*	
		D. Clearance	*		*		*	
		E. Clearance	*		*		*	
		H. Actuator Dia.	*		*		*	
		J. Actuator Height	*		*		*	

CONSTRUCTION

Notes:

1. "*" INFORMATION SUPPLIED BY MANUFACTURER.
2. 120 VAC, 60 Hz, DRIVE CLOSED AND DRIVE OPEN, WITH BUILT-IN THERMAL PROTECTION & 100W ENCLOSURE HEATER.
3. 3/4" NPT CONDUIT CONNECTION (TYP).
4. OPEN AND CLOSE INPUT CONTACT SIGNAL AS THE CONTROL SIGNAL INPUT.
5. LIQUID IS GROUNDWATER / RAINWATER WITH SUSPENDED SOLIDS.

PARSONS ERA PROJECT INSTRUMENT DATA SHEET WBS 1.1.1.1.5	**CONTROL VALVES**	Sheet 3	Job Number SECP/PO175
		Document Number 13400-ATTACHMENT A	Rev C

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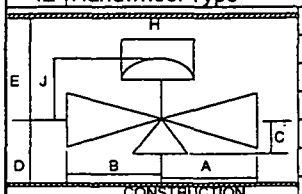
ENG 033

	REQUISITION NO.		VENDOR					
1	Tag No.		FV004					
2	Item No.							
3	Model No.		*					
4	Service		RECEIVING TANK 4 INLET					
5	Line No.		ST-6"-A-7000					
6	P&ID No.		92X-5900-N-00465					
	SERVICE CONDITIONS							
7	Fluid	Units	WATER	GPM				
8	Min Flow	Max Flow	100 GPM	800 GPM				
9	Normal Flow	Sizing Flow						
10	Inlet Press Max	Norm	50 PSIG					
11	dP Max	dP - Valve Sizing	50 PSIG					
12	Temp Max °F	Norm °F	80	50				
13	sp gr @ 60 °F	@ Opr Temp	1	1				
14	Viscosity @ Opr Temp cp		NOTE 5					
	BODY							
15	Body Size	Port Size	6"	N/A				
16	Type of Body		BUTTERFLY VALVE					
17	Material		CARBON STEEL					
18	End Connections		CLASS 150 WAFER					
19	Bonnet		N/A					
20	Lubricator	Isolating Valve	NO	NO				
21	Packing or Seal		BUNA-N OR NITRILE					
22	Position Indicator		NO					
23	Guiding		N/A					
24	No. of Ports		1					
25	Valve Characteristic		LINEAR					
26	Cage		NO					
27	Plug (Disc)		304 SST					
28	Seat		TFE					
29								
30	Cv for Sizing Flow	Furn Cv	*	*				
	NOISE DATA							
31	Line Size	Port Schedule	6"					
32	Insulation							
33	Sound Pressure Level dBA		85 (MAX)					
	ACTUATOR AND ACCESSORIES							
34	Actuator Type		MOTORIZED (NOTE 2 & 3)					
35	Fail Position		LAST POSITION					
36	Close @	Open @	NOTE 4	NOTE 4				
37	dP For Actuator Sizing		50 PSIG					
38	Positioner Required	w/ Filter Rgltr	NO	NO				
39	Bypass	Gauges	NO	NO				
40	For Input Signal of							
41	Output Shall Be							
42	Handwheel Type		MFR. STD.					



CONSTRUCTION

A. Face to Face	*
B. Face to Center	*
C. Face to Center	*
D. Clearance	*
E. Clearance	*
H. Actuator Dia.	*
J. Actuator Height	*

Notes:

1. "*" INFORMATION SUPPLIED BY MANUFACTURER.
2. 120 VAC, 60 Hz, DRIVE CLOSED AND DRIVE OPEN, WITH BUILT-IN THERMAL PROTECTION & 100W ENCLOSURE HEATER.
3. 3/4" NPT CONDUIT CONNECTION (TYP).
4. OPEN AND CLOSE INPUT CONTACT SIGNAL AS THE CONTROL SIGNAL INPUT.
5. LIQUID IS GROUNDWATER / RAINWATER WITH SUSPENDED SOLIDS.

PARSONS ERA PROJECT INSTRUMENT DATA SHEET WBS 1.1.1.1.5	**CONTROL VALVES**	Sheet 4	Job Number SECP/PO175
		Document Number 13400-ATTACHMENT A	Rev C

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ENG 033

	REQUISITION NO.			VENDOR					
1	Tag No.			LSH001		LSH002		LSH003	
2	Item No.								
3	Model No.			*		*		*	
4	Service			RECEIVING TANK 1 HI LEVEL		RECEIVING TANK 2 HI LEVEL		RECEIVING TANK 3 HI LEVEL	
5	P&ID No.			92X-5900-N-00465		92X-5900-N-00465		92X-5900-N-00465	
	SERVICE CONDITIONS								
8	Upper Fluid			WATER		WATER		WATER	
	Lower Fluid			-		-		-	
9	Sp GR @ Opr Temp:	Upper	Lower	1	-	1	-	1	-
10	Pressure (psig)	Max	Normal	ATM	ATM	ATM	ATM	ATM	ATM
11	Temperature °F	Max	Normal	90 °F	50 °F	90 °F	50 °F	90 °F	50 °F
11									
	BODY								
12	Type			FLOAT		FLOAT		FLOAT	
13	Material: Float and Stem			POLYSULFONE		POLYSULFONE		POLYSULFONE	
14	Material: Other Wetted		Linkage	SST	-	SST	-	SST	-
15	Connection Size and Rating			1/8" - NOTE 2		1/8" - NOTE 2		1/8" - NOTE 2	
16	Drain Connections Size and Rating			-		-		-	
17	Reference Figure No.			-		-		-	
18	Float Diameter			< 1-1/4" max.		< 1-1/4" max.		< 1-1/4" max.	
19				-		-		-	
20				-		-		-	
21				-		-		-	
22	Stress Relieving Required			NO		NO		NO	
23	Charpy Test Required			NO		NO		NO	
24	Input Power			120 VAC, 60 Hz.		120 VAC, 60 Hz.		120 VAC, 60 Hz.	
25									
	SWITCH								
26	Type			DRY CONTACT		DRY CONTACT		DRY CONTACT	
27	Enclosure			NEMA 4		NEMA 4		NEMA 4	
28	Conduit Connection and Size			N/A		N/A		N/A	
29	Switch:	Quanity	Form	1	FORM B	1	FORM B	1	FORM B
30	Rating:	Volts	Hertz or DC	120	60 HZ	120	60 HZ	120	60 HZ
31	Rating:	Amps	Watts	20 VA	-	20 VA	-	20 VA	-
32	Differential	Fixed	Adjustable	YES	NO	YES	NO	YES	NO
38	Adjustment	Internal	External	-	-	-	-	-	-
39	Contacts	Open or Close / On Level	Increase or Decrease	CLOSE ON LEVEL INCREASE	-	CLOSE ON LEVEL INCREASE	-	CLOSE ON LEVEL INCREASE	-
35	Load:	Inductive	Noninductive	INDUCTIVE		INDUCTIVE		INDUCTIVE	
40	Actuates			RELAY		RELAY		RELAY	
41									

Notes:

1. "*" - INFORMATION SUPPLIED BY MANUFACTURER.
2. WILL BE INSTALLED IN 1/8" TAPPED, 2" BLIND FLANGE. CONTRACTOR TO PROVIDE 4" EXTENSION TO FLOAT STEM.

PARSONS ERA PROJECT INSTRUMENT DATA SHEET WBS 1.1.1.1.5	**LEVEL SWITCHES**	Sheet 5	Job Number SECP/PO175
		Document Number 13400-ATTACHMENT A	Rev C

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ENG035

14-Nov-97

	REQUISITION NO.					VENDOR					
1	Tag No.				LSH004						
2	Item No.										
3	Model No.				-						
4	Service				RECEIVING TANK 4						
					HI LEVEL						
5	P&ID No.				92X-5900-N-00465						
	SERVICE CONDITIONS										
8	Upper Fluid				WATER						
	Lower Fluid				-						
9	Sp GR @ Opr Temp:	Upper	Lower		1	-					
10	Pressure (psig)	Max	Normal		ATM	ATM					
11	Temperature °F	Max	Normal		90 °F	50 °F					
11											
	BODY										
12	Type				FLOAT						
13	Material: Float and Stem				POLYSULFONE						
14	Material: Other Wetted		Linkage		SST	-					
15	Connection Size and Rating				1/8" - NOTE 2						
16	Drain Connections Size and Rating				-						
17	Reference Figure No.				-						
18	Float Diameter				< 1-1/4" max.						
19					-						
20					-						
21					-						
22	Stress Relieving Required				NO.						
23	Charpy Test Required				NO						
24	Input Power				120 VAC, 60 Hz.						
25											
	SWITCH										
26	Type				DRY CONTACT						
27	Enclosure				NEMA 4						
28	Conduit Connection and Size				N/A						
29	Switch:	Quanity		Form	1	FORM B					
30	Rating:	Volts		Hertz or DC	120	60 HZ					
31	Rating:	Amps		Watts	20 VA	-					
32	Differential	Fixed		Adjustable	YES	NO					
38	Adjustment	Internal		External	-	-					
39	Contacts	Open or Close	On Level	Increase or Decrease	CLOSE ON LEVEL INCREASE	-					
35	Load:	Inductive		Noninductive	INDUCTIVE						
40	Actuates				RELAY						
41											

Notes:

1. "" - INFORMATION SUPPLIED BY MANUFACTURER.
2. WILL BE INSTALLED IN 1/8" TAPPED, 2" BLIND FLANGE. CONTRACTOR TO PROVIDE 4" EXTENSION TO FLOAT STEM.

REQUISITION NO.

Reference Specification Sheet No.

VENDOR

Model No.

GENERAL

1 Description: ___ Recorder ___ Indicator ___ Controller
___ Manual Control Station ___ Trend Recorder
___ Computer Control Station
Other 4-20 mA DC Analog Switch

2 Case ___ Rectangular X Miniature

3 Color Case ___ Black X Standard ___
Dial ___

4 Mounting ___ Flush X Surface ___ Yoke

5 No. Points: N/A Recording : ___ Indicating

6 Chart Type N/A Inches ___ Strip ___ 12-inch Circ.

7 Scale Type N/A Fixed ___ Deviation ___ Length

8 Other ___

9 Chart Drive Spring N/A Electric ___ Pneumatic

10 Chart Speed N/A Wind ___

11 Power Req'd: 120 VAC , 60 HZ ___ Air Press. ___ Explsion Proof

12 Other : Output: DPDT Relay contact, 120 VAC, 5A rating

TREND RECORDER N/A

12 No. of Pens ___ No. of Inputs ___

13 Type ___ Patch Panel ___ Pushbutton ___ Pneumatic

14 Other : ___

CONTROLLER N/A

15 Type : ___ Pneumatic ___ Electric
Other ___

16 Mode : ___ Prop. (Controller) ___ Reset (Controller)
___ Rate (Controller) ___ On-Off (Switch)
Other ___

17 Output ___ 3-15 psi ___ 4-20 mA ___ ___

18 Location: ___ Integral ___ External
Other ___

19 Set Point ___ Manual ___ Computer ___ Cascade Switch
Ratio: ___ Uniform ___ Square Root
Setting Range : ___
Other ___

20 Control Point Span : ___ Fixed ___ Adjustable
Other ___

AUTO-MANUAL SWITCHING N/A

21 No. of Positions ___ Type ___

22 ___ Automatic ___ Manual ___ Computer ___ Ratio
___ Other

RECEIVER ELEMENT

23 ___ Spiral ___ Bellows ___ Bourdon
___ Diaphragm X Electric

24 Material: ___ Bronze X Other : ___

25 Range : ___ 3-15 psi X 4-20 mA DC Other : ___

26 Connection ___ 1/4 in. NPT X Other : ELECTRIC TERM.
___ Back ___ Bottom ___ Other : ___

ACCESSORIES N/A

27 Filter and Regulator : ___

28 Air Supply Gauge : ___

29 Mounting Yoke : ___

30 Restricion Dampener : ___

31 Manifolds : ___

32 Charts : ___

33 Ink Set : ___

34 Alarm :
Number : ___
Actuation: ___ Internal ___ External
Electrical Requirements : ___
Other : ___

35 ___ Computer Access Interface

36 Other: ___

Notes:

1.) "" - INFORMATION SUPPLIED BY MANUFACTURER

2.) THIS DATA SHEET REFERS TO INSTRUMENT FSL010.
ADDITIONAL INFORMATION:

TAG NO.:	FSL010
P&ID\SECTION NO.:	92X-5900-N-00465
SCALE RANGE:	4 - 20 mA DC
SERVICE:	TRANSFER PUMP LOW FLOW CUTOFF

PARSONS ERA PROJECT INSTRUMENT DATA SHEET WBS 1.1.1.1.5	RECEIVER INSTRUMENTS	Sheet 7	Job No. SECP/PO175
		Document Number 13400-ATTACHMENT A	Rev C

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ENG 037

SECTION 13405
INSTALLATION AND CALIBRATION OF INSTRUMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section defines the installation, testing, and calibration requirements of the instruments. The installation contractor is also required to supply instrument fittings, valves, and other accessories which will support the instruments for the Remediation Area 1, Phase II Project.

B. Items installed but not provided under this section are shown on the detail sheets (see Attachment A of this section).

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals

C. Section 13400 - Instruments and Equipment

D. Section 16050 - Basic Electrical Materials and Methods

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings

1.4 REFERENCES

A. American Society of Mechanical Engineers (ASME):

1.	ASME B31.3A-93	Chemical Plant and Petroleum Refinery Piping.
2.	ASME Sec IIA SA-182/SA-182M-95	Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings and Valves and Parts for High Temperature Service

B. National Institute of Standards and Technology (NIST).

1.5 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. Provide Material specifications for instrument valves and fittings, used for the containment of process fluid.

C. Provide product data, using catalog information or data sheets to provide dimensions of components.

D. Items to be submitted to the Construction Manager for approval prior to testing:
   1. Inspection and functional test procedures.
   2. Cleaning procedures: Include a procedure for cleaning prior to connecting tubing and piping to instruments, prior to pressure testing, and after completion of testing.
   3. Pressure testing procedures and types of test equipment to be used.
   4. Repair procedures for piping and tubing materials failing pressure tests.

E. Items to be submitted to the Construction Manager prior to contract closeout.
   1. Certification of Test Equipment (calibration records) used to complete the work as described.
   2. Test reports: Test reports shall be typewritten, listing equipment used, person or persons performing the tests, date tested, device or circuit tested, and results of test.
   3. Calibration reports.

1.5 QUALITY ASSURANCE

A. Materials provided for installation and calibration of instruments shall be as specified herein, and the documentation submitted for verification of materials shall be maintained by the installation contractor for inspection by an FDF, Inc. representative for inspection prior to release for construction or construction acceptance.

1.6 DELIVERY, STORAGE, HANDLING, AND SHIPPING

A. Acceptance at the FEMP

1. Products arriving at the FEMP shall be examined for general damage during shipping. Those products found to be damaged shall not be accepted at the FEMP.

B. Storage and Protection

1. Instrumentation equipment shall be stored according to manufacturer's requirements for storage, if information regarding storage is provided by the manufacturer. In cases where specific storage requirements are not provided, equipment shall be stored in a clean, dry area protected from the weather until required for installation.

1.7 SEQUENCING AND SCHEDULING

A. The sequencing of work and scheduling of tasks for the Remediation Area 1, Phase II shall follow the project schedule and milestones approved by FDF, Inc.

1.8 WARRANTY

A. Special Warranty

1. No special warranty requirements apply.

PART 2 PRODUCTS

A. Instrument Valves and Fittings

1. Instrument Valves and fittings required for the installation of instruments shall be as listed in Attachment A, Instrument Installation details.

B. Test and Calibration Equipment

1. Test and calibration equipment used by the installation contractor shall be calibrated and traceable by tag number, make and model number to an instrument certified by NIST.
2. Test gauges shall have calibration verified or performed within two months prior to use at the work location.
3. Analog test gauges used for calibration shall have a 6-inch dial, 0-200 PSIG range, minor scale divisions of 0.5 PSI, maximum, and accuracy of ±0.25%. Digital test gauges shall be 3-1/2 digit display with ±0.25% accuracy.

PART 3 EXECUTION

3.1 EXAMINATION

A. Prior to installation, instruments and materials shall be free from contamination in accordance with the following:

1. No residual contaminants present that could cause the instrument to become inoperative.
2. No residual moisture present.
3. No corrosion products present, such as rust.

3.2 PREPARATION

A. Remove shipping stops from instruments before implementing procedures listed herein. Small pressure gauges or output gauges supplied with component assemblies will not require calibration.

1. Check operation of gauges. Replace defective gauges.

2. Verify data on nameplate with respect to operating range, operating temperature, specific gravity, etc. Verify conformance to instrument data sheets.

3.3 ERECTION/INSTALLATION/APPLICATION

A. General

1. Instruments shall be positioned so that the operator will have an unobstructed view of the indicators and gauges.
2. The hand valves shall be positioned so that handwheels or handles shall be facing the operating area and are easily accessible without any obstruction or interference.
3. Drain and blowdown valves shall be located so that they are accessible without the use of a ladder or a portable platform and away from walkways, aisles, and operating areas.
4. Joiners (length of pipe made by welding together pieces shorter than 20 feet) shall not be permitted. Where piping line classes interface with instrument piping classes, a threaded NPT pipe connection shall be utilized.

B. Electrical Connections

1. The instruments connected to piping shall use watertight flex conduit and fittings for connection between the instrument and the rigid conduit. The length of the flex conduit shall not exceed 3 feet. All other electrical connections to instruments shall use rigid conduit as defined in the electrical specification section, Section 16050.

C. Threaded Connections

1. When installing instruments, low-halogen nuclear grade "Never-Seez" compound shall be used for sealant. Sealant shall be applied to male threads only. Sealant compound shall cover all male threads.

D. Instrument Tagging

1. Instruments not tagged by the vendor and requiring identification shall be tagged accordingly with a stainless steel 1-inch by 2½-inch by 1/16-inch-thick tag (minimum). Lettering shall be minimum ¼-inch high and stamped so that it can be easily read and identified.
2. Tags shall be secured to the instruments by a beaded stainless steel chain so that they will remain on the instrument.

E. In general, instrument installation, including supports, valves, instruments, fittings, and all associated work, will be inspected by the FDF, Inc. Construction Contracts Manager. Defective work or failure to follow these procedures shall result in disassembly and/or rework at no additional cost to FDF, Inc..

3.4 ADJUSTING

A. Calibration: Calibrate instruments and components in accordance with manufacturer's calibration data over the full operational range; verify instruments to be within published specification and accuracy; and affix a calibration sticker.

1. Instruments shall be calibrated individually and, where applicable, as a system.
2. Components which have adjustable features shall be carefully set for specific conditions and applications of this project.
3. Calibration sticker shall contain the following information:
   a. Equipment identification tag number
   b. Range of calibration
   c. Date and name of persons doing calibration
   d. Date of next scheduled calibration

B. Calibration Ranges:

1. Pressure Gauges: Check at 10 percent, 50 percent, and 90 percent of their ranges for linearity within manufacturer's stated specifications.
2. Control Valves and Operators: Operation of control valves and operators shall be verified by impressing appropriate signals on the operator input.
   a. Verify that control valve seats are free from foreign material and properly positioned for intended service.
3. Field Transmitters: Check zero and span at 10 percent, 50 percent, and 90 percent of range by impressing measured signal into input or signal connections, in accordance with manufacturer's instructions.

C. Instrument Calibration Requirements: For detailed performance requirements or calibration settings, refer to the instrument data sheets and the Instrument Loop Diagrams.

3.5 CLEANING

A. Instruments shall be cleaned in accordance with the manufacturer's recommended cleaning procedures.

B. After cleaning, work shall be free from contamination in accordance with the following:

1. No contaminants present that could cause the instrument to become inoperative.
2. No moisture present.
3. No corrosion products present, such as rust.

3.6 DEMONSTRATION

A. The Construction Manager shall be given a minimum of 2 working days notification prior to site testing or retesting.

3.7 PROTECTION

A. To protect sensitive instruments from overpressure damage during piping pressure test, the instruments (transmitters, pressure gauges and switches, and other instruments) shall be disconnected from the piping to be tested.

B. Instrument openings shall be covered, capped, or plugged to prevent ingress of foreign matter.

C. Disconnected ends of piping and tubing shall be plugged with appropriate pipe and tube fittings to allow the piping pressure test to be conducted.

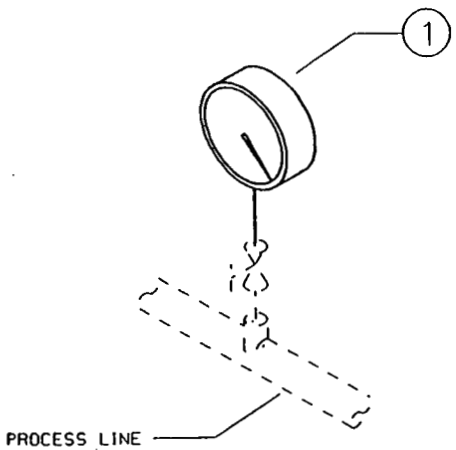
3.8 ATTACHMENTS

A. The following Detail Sheets are attached to this Section:

END OF SECTION

ATTACHMENT A

INSTALLATION DETAILS



BILL OF MATERIAL

ITEM	QUANTITY REQUIRED	UM	DESCRIPTION	NOTES	VENDOR CAT. NO.
1	1	EA	PRESSURE GAUGE PER DATA SHEET		

NOTES:

1. CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS HARDWARE INCLUDING FITTINGS, NOT IDENTIFIED IN THE BILL OF MATERIAL, IN ORDER TO PROVIDE A COMPLETE ASSEMBLY.

INST. TAG NO.

PI103
PI104

PRESSURE GAUGE WITH ISOLATION VALVE

PARSONS ERA PROJECT

WBS 1.1.1.1.5

SHEET	JOB NUMBER
1	CRU2/P0175
DOCUMENT NUMBER	REV
13405-ATTACHMENT A	C

SK-N-04620

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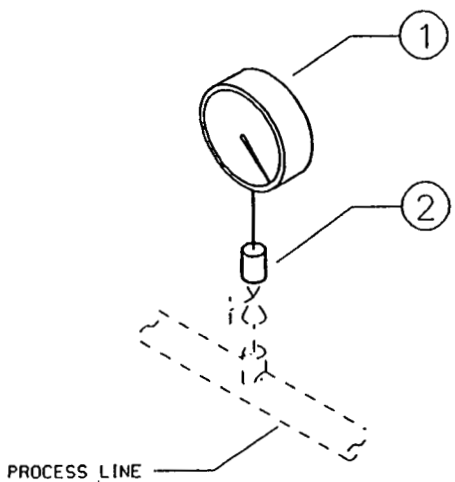


BILL OF MATERIAL

ITEM	QUANTITY REQUIRED	UM	DESCRIPTION	NOTES	VENDOR CAT. NO.
1	1	EA	PRESSURE GAUGE PER DATA SHEET		
2	1	EA	PRESSURE SNUBBER - ½" NPT		

NOTES:

1. CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS HARDWARE INCLUDING FITTINGS, NOT IDENTIFIED IN THE BILL OF MATERIAL, IN ORDER TO PROVIDE A COMPLETE ASSEMBLY.

INST. TAG NO.

PI102

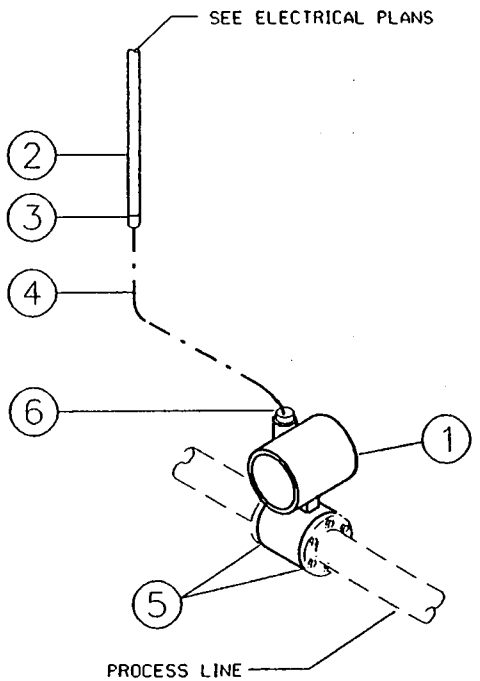
PRESSURE GAUGE WITH ISOLATION VALVE AND SNUBBER

PARSONS ERA PROJECT

WBS 1.1.1.1.5

SHEET	JOB NUMBER
2	CRU2/P0175
DOCUMENT NUMBER	REV
13405-ATTACHMENT A	C

SK-N-04614



BILL OF MATERIAL

ITEM	QUANTITY REQUIRED	UM	DESCRIPTION	NOTES	VENDOR CAT. NO.
1	1	EA	MAGNETIC FLOW METER PER DATA SHEET	4	
2	AS REQ'D	FT	CABLE, CONDUIT AND FITTINGS		
3	1	EA	¾" NPT X ½" WATERTIGHT FLEX CONNECTOR		
4	AS REQ'D	FT	½" WATERTIGHT FLEX CONDUIT		
5	2	EA	GASKET MATERIAL	3	
6	1	EA	½" NPT X ½" WATERTIGHT FLEX CONNECTOR		

NOTES:

1. CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS HARDWARE INCLUDING FITTINGS NOT IDENTIFIED IN THE BILL OF MATERIAL, IN ORDER TO PROVIDE A COMPLETE ASSEMBLY.
2. QUANTITIES ARE FOR ESTIMATES ONLY. ACTUAL QUANTITIES ARE BY CONTRACTOR.
3. PIPING CONTRACTOR SHALL PROVIDE AND INSTALL GASKET MATERIAL PER MANUFACTURER'S RECOMMENDATIONS.

INST. TAG NO.

FE/FIO/FSL-010

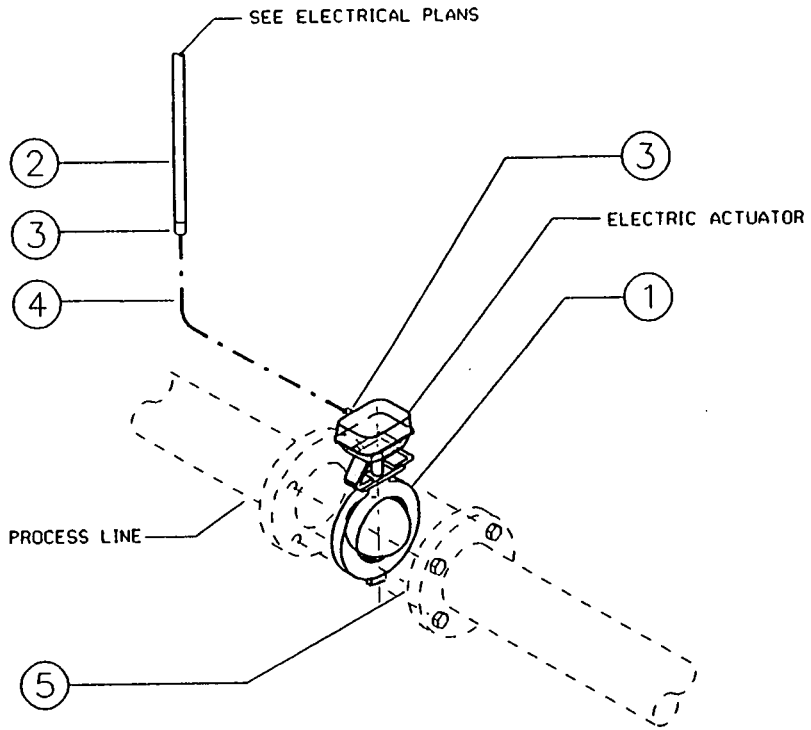
FLOWMETER - MAGNETIC WITH INTEGRAL TRANSMITTER (WAFER STYLE)

PARSONS ERA PROJECT

WBS 1.1.1.1.5

SHEET	JOB NUMBER
3	CRU2/P0175
DOCUMENT NUMBER	REV
13405-ATTACHMENT A	C

SK-N-04615



BILL OF MATERIAL

ITEM#	QUANTITY REQUIRED	UM	DESCRIPTION	NOTES	VENDOR CAT. NO.
1	1	EA	BUTTERFLY VALVE WITH ELECT. ACTUATOR		
			PER DATA SHEET		
2	AS REQ'D	FT	CABLE, CONDUIT AND FITTINGS		
3	2	EA	¾" WATERTIGHT FLEX CONNECTOR		
4	AS REQ'D	FT	¾" WATERTIGHT FLEX CONDUIT		
5	2	EA	GASKET MATERIAL	3	

NOTES:

1. CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS HARDWARE INCLUDING FITTINGS, NOT IDENTIFIED IN THE BILL OF MATERIAL, IN ORDER TO PROVIDE A COMPLETE ASSEMBLY.
2. QUANTITIES ARE FOR ESTIMATES ONLY. ACTUAL QUANTITIES ARE BY CONTRACTOR.
3. PIPING CONTRACTOR SHALL PROVIDE GASKET MATERIAL PER MANUFACTURER'S RECOMMENDATIONS.

INST. TAG NO.

FV001
FV002
FV003
FV004

BUTTERFLY VALVE WITH ELECTRIC ACTUATOR

PARSONS ERA PROJECT

WBS 1.1.1.1.5

SHEET	JOB NUMBER
4	CRU2/P0175
DOCUMENT NUMBER	REV
13405-ATTACHMENT A	C

SK-N-04616

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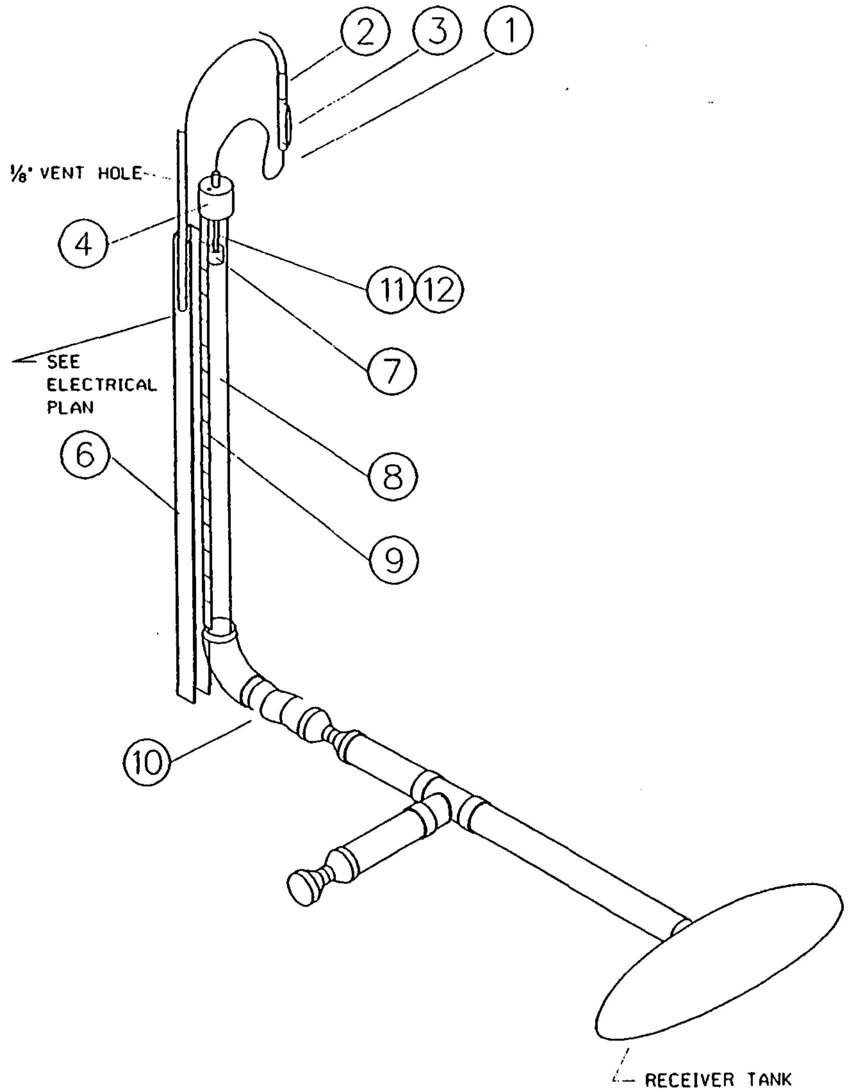

BILL OF MATERIAL

ITEM#	QUANTITY REQUIRED	UM	DESCRIPTION	NOTES	VENDOR CAT. NO.
1	1	EA	3/4" CABLE AND CORD FITTING, MALE, STRAIGHT		CGB292 OR EQUAL
2	AS REQ'D	FT	3/4" CONDUIT, AND FITTINGS		
3	1	EA	CONDUIT OUTLET BODY, CROUSE-HINDS STYLE C		
4	1	EA	2" SCH 40 PVC PIPE CAP	6	
6	AS REQ'D	FT	1 1/2" X 1 1/2" GAGE 12 GALVANIZED CHANNEL	3	
			ERECTOR SYSTEM		
7	1	EA	LEVEL SWITCH, FLOAT TYPE AS PER DATA SHEET		
8	AS REQ'D	FT	2" SCH 40 TRANSPARENT PVC PIPE	1 & 5	
9	AS REQ'D	FT	MEASURING TAPE	4	
10	AS REQ'D	FT	2" HOSE AND FITTINGS TO MATCH PIPING	1	
			SPECIFICATION 15060		
11	1	EA	1/8" FNPT BRASS COUPLING		
12	1	EA	1/8" NPT X 4" LONG BRASS NIPPLE		

NOTES:

1. CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS HARDWARE INCLUDING FITTINGS NOT IDENTIFIED IN THE BILL OF MATERIAL, IN ORDER TO PROVIDE A COMPLETE ASSEMBLY.
2. QUANTITIES ARE FOR ESTIMATES ONLY. ACTUAL QUANTITIES ARE BY CONTRACTOR.
3. CHANNEL ERECTOR SYSTEM SHALL EXTEND A MINIMUM OF 3 FEET BELOW GRADE. PIPE SHALL BE SECURED USING A PIPE STRAP DEVICE.
4. MEASURING TAPE TO SHOW HEIGHT OF RECEIVER TANK LEVEL FROM EMPTY TO FULL. MARKINGS TO BE A MINIMUM OF EVERY INCH WITH A NUMERIAL MARKING EVERY 6".
5. CLEAR PVC PIPE HEIGHT TO BE DESIGNED BY CONTRACTOR TO MATCH TANK PURCHASED. FLOAT SWITCH TO ACTIVATE WHEN TANK IS FULL.
6. CAP MUST NOT BE PERMANENTLY ATTACHED TO PVC PIPE. CAP IS REQUIRED TO BE REMOVED FOR MAINTENANCE OF FLOAT SWITCH.

INST. TAG NO.'S

LG/LSH001
LG/LSH002
LG/LSH003
LG/LSH004

LEVEL SWITCH FLOAT SWITCH TYPE

PARSONS ERA PROJECT

WBS 1.1.1.1.5

SHEET	JOB NUMBER
5	P0175
DOCUMENT NUMBER 13405 ATTACHMENT A	REV C

SK-N-04617

000225

U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

REMEDIATION AREA 1, PHASE II
SITE PREPARATION AND REMEDIATION PACKAGE
TECHNICAL SPECIFICATIONS

Division 15

PARSONS

Prepared by: _____
Date

Checked by: _____
Date

SECTION 15060
PIPE, FITTINGS, VALVES, AND ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe.

B. Fabricated piping assemblies.

C. Fittings.

D. Valves.

E. Specialty items.

F. Supports.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 02668 - Remediation Generated Water Transfer Lines.

D. Section 15090 - Piping Supports and Anchors.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. American Society of Mechanical Engineers (ASME):

1. ASME A13.1-96 Scheme for the Identification of Piping Systems.
2. ASME B16.5-96 Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24.

3.	ASME B16.25-97	Buttwelding Ends.
4.	ASME B31.3-96 1996 Addenda	Process Piping.

B. American Society for Nondestructive Testing (ASNT):

1.	ASNT-SNT-TC-1A-92	Personnel Qualifications and Certification Recommended Practice, December 1992 Edition.

C. American Society for Testing and Materials (ASTM):

1.	ASTM-A53-96	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2.	ASTM-A105/ A105M-96	Standard Specification for Carbon Steel Forgings for Piping Applications.
3.	ASTM A193/ A193M-Rev. B-96	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
4.	ASTM-A194/ A194M-96	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
5.	ASTM-A216/ A216M-93	Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High Temperature Service.
6.	ASTM-A234/ A234M Rev. B-96	Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
7.	ASTM D3035-95	Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.

D. American Water Works Association (AWWA):

1.	AWWA C906-90	Polyethylene (PE) Pressure Pipe and Fittings, 4-Inch through 63-Inch, for Water Distribution.

E. American Welding Society (AWS):

1.	AWS A5.1-91	Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.

1.5 SUBMITTALS

A. Submittals shall be in accordance with Section 01011.

B. Product Data for pipe, fittings, valves, and accessories, with bid.

C. Shop drawings for shop-fabricated piping assemblies, including spool piece drawings, with shipment.

D. Installation, maintenance, and operation instruction manuals for valves and accessories, with shipment.

E. Certificates of conformance that material and equipment meet specification requirements, with shipment.

F. Test procedures for required testing, with shipment. Test procedures shall include criteria for acceptable performance.

G. Procedures for repair or replacement of piping failing tests and/or examination, with shipment.

H. Pressure test and examination reports, with shipment.

I. Welder and examiner qualifications, procedure qualification records, and welding procedure specifications, with shipment.

1.6 QUALITY ASSURANCE

A. Except where more stringent requirements are specified or indicated, the work specified herein shall conform to ASME B31.3.

B. Welding Procedures and Qualifications
   1. Fabrication, assembly, and erection shall be in accordance with ASME B31.3.
   2. Welder qualifications shall be made available to, and approved by, FDF.
   3. Nondestructive testing personnel qualifications shall be in accordance with ASNT SNT-TC-1A.

C. Inspection, Examination, and Testing
   1. Inspection, examination, and testing shall be in accordance with ASME B31.3, except HDPE piping shall be tested as specified in Section 02667.
   2. FDF shall be given advance written notification prior to any testing.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaging
   1. Materials shall be cleaned to remove chips, slag, weld spatter, oil, grease, debris, and other foreign material prior to packaging for shipment. Openings shall be covered, capped, or plugged to prevent damage and the ingress of foreign materials during shipment and storage. Tape alone shall not be used for sealing openings.

B. Storage and Handling
   1. Piping materials and prefabricated assemblies shall be stored off the ground and handled with care so that physical damage, contamination, or corrosion of the piping materials does not occur. End seals of pipe, flange covers, valve covers, and similar protection shall not be removed until necessary for cleaning, fabrication, inspection, and erection.
   2. Welding rods and electrodes shall be stored, handled, and identified to ensure the use of the

proper welding rod. Electrode ovens for the storage of low-hydrogen welding rods shall be used.

PART 2 PRODUCTS

2.1 PRODUCTS/EQUIPMENT

A. Piping and Valve Specification
1. Piping materials and valves shall meet the requirements indicated on the piping material data sheets in Attachment A.
2. For underground piping, see Section 02667.
3. Use long radius welding fittings, except where shown otherwise, or where space limitations require use of short radius fittings.

B. Hose Couplings:
1. Coupler: Aluminum with Buna-N gasket, installed on hose; Civacon "Twin-Cam" No. 633-C, or equal.
2. Adaptor: Aluminum, female NPT; Civacon No. 633-A, or equal.

C. Water Transfer Hose: Cross-linked polyethylene tube, reinforced with synthetic fabric and double wire helix; 150 psig working pressure; "Goodyear XLPE", or equal.

D. Pump Suction Strainer:
1. Type: Duplex basket strainer with quick opening strainer covers and integral diverter plug valve.

2. Construction: Cast iron body, stainless steel baskets, Buna-N O-rings, Class 125 flanged end connectors, 0.125 inch basket perforations.
3. Manufacturer and Model: Hayward Model 50, or equal.

2.2 LABELING

A. Valve Identification

1. Each valve shall be identified with the unique valve number and description, as shown on the P&IDs.
2. The tag shall not be attached to any part of the valve which may interfere with valve operation.
3. Valve identification tags on insulated valves shall be located outside the insulation jacketing and be easily accessible for inspection.
4. Label size shall be based on using 1/2-inch letters.
5. Labels shall be constructed of nonreflective corrosion-resistant materials, with good contrast and legibility.

B. Pipe Identification

1. Identify the flow medium and the flow direction for piping systems including insulated pipe by labeling adjacent to each valve, adjacent to abrupt pipe directional change, and at intervals of 50 feet along exposed pipe. Pipes shall be labeled as indicated on the P&IDs and in accordance with ASME A13.1.
2. Content, size, material type, line number, and insulation requirements for each pipeline shall be identified on drawings as follows. Refer to the P&ID symbols and legend for additional information.

Example ST - 4" - A - 1000 - ET

Medium Code	Size	Material Code	Line Number	Insulation
ST	4"	A	1000	ET

C. Product Marking

1. Piping materials shall be marked in accordance with the applicable ASTM specification as indicated on the piping material data sheets in Attachment A.

2. Welding rod and electrode packages shall be marked in accordance with AWS A5.1.
3. Welding rods and electrodes shall be identified in accordance with AWS A5.1. In addition, welding rods 1/8-inch diameter and over shall be marked or stamped with positive identification marks at intervals of not more than 18 inches. Such marks shall include the classification number of the welding rod and the trade designation of the manufacturer.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Primer Application
1. Non-insulated carbon steel piping shall be prime coated after fabrication.

3.3 ERECTION/INSTALLATION

A. Layout, Cutting, and Fitting Up
1. Piping shall be Category D fluid service under ASME B31.3.
2. Assembled piping shall be installed without springing, forcing, or cold bending. Cutting or otherwise weakening structural members to facilitate piping installation shall not be permitted.
3. Butt-welded pipe shall be beveled in accordance with ASME B16.25.
4. Install valves with stems upright or horizontal, not inverted.
5. Slope field-routed piping and tubing, and arrange to drain at all low points.

B. Welding

1. Welding electrodes shall be in accordance with AWS A5.1.
2. Socketwelds shall be made by shielded metal arc or gas tungsten arc welding process.
3. Socketweld joints shall be assembled so that the space between the end of the pipe and the bottom of the socket is no less than 1/16 inch or no more than 1/8 inch.
4. Field welding shall be minimized through maximum use of shop-fabricated piping assemblies.
5. Arc strikes and weld starts shall not be made on the base metal outside the weld groove nor inside an area which will be encompassed by a fillet or socket weld. Inadvertent arc strikes outside a weld zone shall be removed by grinding or filing, and the arc strike area shall be visually examined under 5X magnification.

C. Flanged Joints

1. Flange isolation kits shall be used between all dissimilar metal flanges.
2. The mating surfaces of the flanges shall be in a plane that is perpendicular to the axis of the pipe. Flanges shall be rotated so that the bolt holes straddle the vertical flange centerline. Gaskets shall be evenly centered between the flange faces with ring-type gaskets engaging fully upon raised-face flanges. Flanges shall mate flush and the bolts shall be tightened uniformly to draw the flanges evenly and firmly upon the gasket. Bolts shall be torqued within the flange manufacturer's recommended range and tightening sequence.
3. Flat ring-type gaskets shall be used between steel flanges equipped with raised serrated faces.
4. Where metallic flanges are bolted to non-metallic flanges, both shall be flat-faced flanges. Full-face gaskets shall be used.
5. When piping, valves, fittings, or equipment having cast iron flanges are used, mating flanges shall be flat faced with full-faced gaskets.

6. Flanged joints shall be made with new gasket and bolting materials. Bolts and nuts damaged during installation shall be replaced.

D. Install HDPE piping and make butt fusion joints in accordance with the manufacturer's instructions.

E. At least 5 percent of fabricated piping shall be visually examined by an examiner qualified and certified in accordance with ASNT SNT-TC-1A.

3.4 QUALITY CONTROL

A. Hydrostatic Testing

1. Piping systems shall be hydrostatically leak tested in accordance with ASME B31.3, Chapter VI.
2. Pressure vessels, equipment, and instruments shall not be included in these tests if they will be damaged by the test pressure.
3. Equipment which is not to be subjected to the pressure test shall be disconnected from the piping and a pipe spool inserted in its place, or the equipment may be isolated by way of a single-line blind. Valves may be used provided that the valve is suitable for the proposed test procedure.
4. Hydrostatic test pressures shall be 1.5 times the design pressure, as shown in the following table:

SERVICE	MEDIUM CODE	MATERIAL CODE	DESIGN PRESSURE (psig)	TEST PRESSURE (psig)
Stormwater	ST	A	100	150
Stormwater	ST	B4	See Section 02667	

5. Leak testing shall not start until the testing procedure has been approved by the Construction Manager.
6. Connections/joints (including welds) shall be left uninsulated, unpainted, and exposed for examination for leakage during testing.

7. The piping system shall be examined prior to leak testing to ensure that connections are tight.
8. Test pressure gauges shall be calibrated no more than 90 days prior to the hydrostatic leak test. Gauges shall be selected so that the test pressures are at the mid-range of the gauge. Documentation shall be maintained and made available showing reliability of calibrated equipment.
9. Every precaution shall be taken during testing to ensure personnel safety.
10. Pressure gauges shall not be subjected to pressure in excess of their scale range.
11. Control valves (unless being tested) shall be set and maintained in the full OPEN position.
12. Lines containing check valves shall have the pressure applied upstream of the check valve so that pressure is applied under the seat.
13. Joints found to be defective shall be repaired and retested. Retest pressures shall be the same as those originally specified for the test.
14. Hydrostatic test pressures shall not be applied until the piping system and the testing medium have reached thermal equilibrium.
15. High-point vents and low-point drains shall be provided for hydrostatic tests.

3.5 CLEANING

A. System Cleaning and Flushing

1. The interior and exterior of pipe shall be kept clean at all times.

END OF SECTION

ATTACHMENT A

PIPING MATERIAL DATA SHEETS

PIPING MATERIAL DATA SHEET	MAT'L CODE A PAGE 1 OF 3

RATING: CLASS 150
MATERIAL:CARBON STEEL

CORROSION ALLOWANCE: 0.125"
PRESSURE LIMIT: PER ASME/ANSI B16.5
TEMPERATURE LIMIT: -20°F TO 400°F

CODE NUMBER	ENCODER	SIZE FROM	SIZE TO	DESCRIPTION	NOTES	REV
				PIPE		
		3/8"	2"	SEAMLESS CARBON STEEL, ASTM A53 GRADE B, EXTRA STRONG, PLAIN ENDS.		
		2-1/2"	20"	SEAMLESS CARBON STEEL, ASTM A53 GRADE B, STANDARD WEIGHT, BEVELED ENDS.		
				FLANGES		
		1/2"	2"	CLASS 150, CARBON STEEL, RF, ASTM A105, SOCKETWELD (XS BORE).		
		2-1/2"	20"	CLASS 150, CARBON STEEL, RFSF, ASTM A105, WELD NECK (STD WT BORE).		
		1/2"	20"	CLASS 150 BLIND, CARBON STEEL, ASTM A105, RFSF.		
				FITTINGS		
		3/8"	2"	CLASS 3000, CARBON STEEL, ASTM A105; SOCKETWELD.		
		3/8"	2"	CLASS 3000, SCREWED CARBON STEEL, ASTM A105 THREADOLET. CAP. PLUG, SQUAREHEAD. PLUG, HEX HEAD.	 1,3 1 1 3	
		2-1/2"	20"	SEAMLESS CARBON STEEL, BUTT WELD ENDS, ASTM A234 GRADE WPB, STANDARD WEIGHT.		
				SWAGES		
		3/8"	4"	SCHEDULE 80 CARBON STEEL, ASTM A234, GRADE WPB, PREPARE ENDS AS REQUIRED (BEVELED, PLAIN OR THREADED).	2	
				GASKETS		
		1/2"	20"	TEFLON, 1/8" THICK		

PIPING MATERIAL DATA SHEET				MAT'L CODE A PAGE 2 OF 3	
CODE NUMBER	ENCODER	SIZE FROM TO	DESCRIPTION	NOTES	REV
			BOLTING		
			STUD BOLTS WITH 2 HEAVY HEX NUTS, ASTM A193 GRADE B7/ASTM A194 GRADE 2H.		
			BRANCHES		
			SEE CHART		
			BALL VALVES		
		3/8" - 2"	CLASS 300 CARBON STEEL, ASTM A105, SOCKETWELD, CHROME PLATED BALL, RTFE SEATS, WRENCH OPERATOR.	4, 5	
			BALL VALVES		
		2-1/2" - 8"	CLASS 150 CARBON STEEL, ASTM A216, GRADE WCB RF FLG, CHROME PLATED BALL, RTFE SEATS, WRENCH OPERATOR FOR 4 INCH AND SMALLER, GEAR OPERATOR FOR 6 INCH AND LARGER.	4, 5	
			BUTTERFLY VALVES		
		1" - 20"	CLASS 150, CAST IRON, ASTM A126, CLASS B, WAFER STYLE, 316 SS STEM AND DISC, EPDM SEAT, INTEGRAL FLANGE SEALS, LEVER HANDLE OPERATOR FOR 1-4 INCH, GEAR OPERATOR FOR 6 INCH AND LARGER. USE THREADED LUG TYPE WHERE SHOWN ON THE DRAWINGS.	4, 5	
			CHECK VALVES		
		1/2" - 2"	CLASS 150, CAST STEEL, ASTM A216, GRADE WCB, RF FLANGE, SWING TYPE, 11-13 CR TRIM.		
		2-1/2" - 20"	CLASS 150, CAST STEEL, ASTM A216, WAFER STYLE, CARBON STEEL DISC, STAINLESS STEEL SPRING, SILENT CHECK VALVE.		
			GLOBE VALVES		
		1/2"	CLASS 2500, 316 STAINLESS STEEL, DELRIN SEAT, THREADED ENDS AND GAUGE PORTS; SWAGELOK "WHITEY" P AND PG SERIES, OR EQUAL.	6	
		1/2" - 2"	CLASS 800, CARBON STEEL, ASTM A105, SOCKETWELD, BOLTED BONNET, OS&Y, 12 PERCENT CHROME TRIM.	4, 5	
		2-1/2" - 20"	CLASS 150, CARBON STEEL, ASTM A216 GRADE WCB.RF FLANGE, 12 PERCENT CHROME TRIM.	4, 5	

PIPING MATERIAL DATA SHEET				MAT'L CODE A PAGE 3 OF 3	
CODE NUMBER	ENCODER	SIZE FROM TO	DESCRIPTION	NOTES	REV
			GATE VALVES		
		1/2" - 2"	CLASS 800, CARBON STEEL, ASTM A105, SOCKETWELD ENDS, OS&Y, BOLTED BONNET, SOLID WEDGE, 12% CR TRIM.	4, 5	
		2-1/2" - 20"	CLASS 150, CAST STEEL, ASTM A216, GRADE WCB, RF FLANGE, 11-13 CR TRIM, O.S. & Y	4, 5	
			PIPE NIPPLES		
			CARBON STEEL, ASTM A53, GRADE B		
		1/2" - 2"	SCH 160, TBE, SMLS 3 INCHES LONG		
		1/2" - 2"	SCH 160, TBE, SMLS 6 INCHES LONG		
		1/2" - 2"	SCH 160, POE-TOE, SMLS 3 INCHES LONG		
		1/2" - 2"	SCH 160, POE-TOE, SMLS 6 INCHES LONG		
		1/2" - 2"	SCH 160, PBE, SMLS 3 INCHES LONG		
		1/2" - 2"	SCH 160, PBE, SMLS 6 INCHES LONG		
			NOTES		
			1. USE FOR UNVALVED VENTS AND DRAINS. 2. USE SWAGES WHERE SMALL END IS 2 INCHES AND SMALLER. USE WELD REDUCER WHERE SMALL END IS 2 1/2 INCHES AND LARGER. 3. USE FOR PROCESS DRAIN. 4. EQUIP VALVE WITH LOCKING DEVICE. 5. VALVE HANDLE STEMS SHALL PROTRUDE SUFFICIENTLY THROUGH PIPE INSULATION TO ALLOW VALVE OPERATION WITHOUT HAND ABRASION OR PINCHING. 6. USE FOR PRESSURE GAUGE ISOLATION ONLY.		

PIPING MATERIAL DATA SHEET
MATERIAL CODE A
BRANCH CONNECTION CHART

Run Size

1/2	3/4	1	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36	
SWT	SRT	SRT	SRT	SRT	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL			1/2
	SWT	SRT	SRT	SRT	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL			3/4
		SWT	SRT	SRT	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL			1
			SWT	SRT	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL			1 1/2
				SWT	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL	SOL			2
					WT	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL			2 1/2
						WT	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL			3
							WT	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL			4
								WT	WOL	WOL	WOL	WOL	WOL	WOL	WOL	WOL			6
									WT	WOL	WOL	WOL	WOL	WOL	WOL	WOL			8
										WT	WOL	WOL	WOL	WOL	WOL	WOL			10
											WT	WOL	WOL	WOL	WOL	WOL			12
												WT	WOL	WOL	WOL	WOL			14
													WT	WOL	WOL	WOL			16
														WT	WOL	WOL			18
															WT	WOL			20
																WT			24
																			30
																			36

Legend

SOL = Sockolet
SRT = Socketweld Reducing Tee
SWT = Socketweld Tee
WOL = Weldolet
WT = Buttweld Tee

PIPING MATERIAL DATA SHEET	MAT'L CODE B4 (SPEC) PAGE 1 OF 1

RATING: CLASS 100
FACING: N/A
MATERIAL: HDPE

CORROSION ALLOWANCE: NONE
PRESSURE LIMIT: 100 psig
TEMPERATURE LIMIT: -20°F TO 120°F

CODE NUMBER	ENCODER	SIZE FROM	SIZE TO	DESCRIPTION	NOTES	REV
				PIPE		
		4"	8"	HDPE, (PE 3408), ASTM D3035, SDR 11, BUTT FUSION WELD JOINTS.		
				FITTINGS		
		4"	8"	AWWA C 906, MOLDED, BUTT FUSION WELD.		
				FLANGES		
		4"	8"	MOLDED FLANGE ADAPTER WITH SLIP-ON METAL FLANGE. ASTM A193B7/A1942H BOLTING.		

SECTION 15160
TRANSFER PUMPS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Centrifugal pumps (Nos. PMP-1 and 2)

B. Pumps shall be furnished, installed, and operated by Contractor, and shall shall become Construction Manager's property after completion of work.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 15170 - Motors.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. Hydraulic Institute Standards.

B. American Society of Mechanical Engineers (ASME):
1. ASME B73.1M-91 Horizontal End Suction Centrifugal Pumps for Chemical Process.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. Product Data: Certified pump curves showing performance characteristic with pump and system operating point plotted, including minimum and maximum flow. Include net positive suction head curve.

C. Completed Pump Data Sheets.

D. Certificates: Alignment certification, certificates of conformance to specification requirements, and certificates guaranteeing performance at design point.

E. Installation instructions, start-up and troubleshooting instructions, operational and maintenance data, lubrication instructions, and spare parts list.

1.6 QUALITY ASSURANCE

A. The Quality Assurance Plan of the Contractor shall be submitted to the Construction Manager for approval prior to the start of fabrication or installation.

B. Tests will be witnessed by the Consruction Manager. The Contractor shall provide notice to the Construction Manager 2 weeks prior to the test.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry place and protect from weather prior to shipment. Provide protection from weather and from damage during transit.

B. Loose items shall be tagged and delivered in a standard commercial package. The package shall be protected from the weather, from climate conditions including temperature and humidity variations, and from dirt, dust, and other contaminants that could adversely affect assembly and operation of the pumps.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Goulds Model 3196, or equal.

2.2 EQUIPMENT

A. General Construction Requirements

1. The balancing of the rotating parts, statically and dynamically, shall be in accordance with the manufacturer's standards.
2. All couplings shall be complete with "guarding" of any possible "nip point." This guarding shall have a maximum of 1/2-inch opening.

B. Pumps
1. See Attachment A, Pump Data sheet.

C. Sound power levels shall not exceed 85 dBA at 5 feet.

2.3 FABRICATION

A. Prior to shipment, the pump/motor assembly shall be cleaned of all dirt, dust, grease, grime, weld spatter, and other foreign material. Pumps shall be primed and painted in accordance with manufacturer's standard finish. Any open end connections shall be sealed to prevent the entrance of foreign material.

2.4 LABELING

A. Equipment Identification: All pumps shall be provided with a permanently attached stainless steel nameplate indicating equipment name, number, model number, and rated capacity. Lettering shall be a minimum of 3/8-inch high and shall be stamped. Nameplates shall be located for unobstructed viewing when equipment is installed.

PART 3 EXECUTION

3.1 ERECTION/INSTALLATION/APPLICATION

A. The installation of the equipment specified and shown on the drawings shall be in accordance with the manufacturer's instructions.

B. A copy of the manufacturer's installation instructions, start-up and troubleshooting instructions, operation

and maintenance data, lubrication instructions, and spare parts list shall be available at the site.

C. Pump manufacturer shall provide services of Service Engineer during pump installation, start-up, and testing.

3.2 QUALITY CONTROL

A. Tests: Each pump shall be tested in the manufacturer's shop in accordance with the Hydraulic Institute Standards. In addition, acceptance operating tests shall be performed by the Contractor after installation. If the results are unsatisfactory, the Contractor shall adjust or replace the equipment to meet the specification requirements and retest the equipment.

B. The Contractor shall notify the Construction Manager of testing and inspection activities prior to the start of all tests and inspections.

C. Testing shall not start until the testing procedure has been approved by the Construction Manager.

3.3 DEMONSTRATION

A. Demonstrate ability to meet full range of operating flow rates and operating point as shown on pump curves. Vibration shall be within manufacturer's acceptable range.

3.4 TURN OVER

A. Upon completion of project, pumps shall transferred to a Construction Manager designated site storage area and turned over to the Construction Manager in good working conditon.

END OF SECTION

ATTACHMENT A

PUMP DATA SHEET

PUMP DATA SHEET

PROJECT TITLE:	Remediation Area 1, Phase II						PROJECT ORDER: 175	
PUMP NAME:	Transfer Pumps						QUANTITY: 2	
TYPE PUMP:	Base-mounted horizontal centrifugal						EQUIP NO.: PMP-1 and 2	
TYPE DRIVER:	Electric motor (Note 1)		SUPPLY W/PUMP: YES			DRAWING NO.: 92X-5900-N-00465		
MANUFACTURER AND MODEL NO.:								
OPERATING CONDITIONS								
FLUID PUMPED:	Groundwater		AT A PUMPING TEMPERATURE OF:	60	°F			
SPECIFIC GRAVITY: 1.0	AT 60°F	NA	AT P.T.	VISCOSITY: NA	AT P.T.			
SOLIDS IN FLUID:	WT%	DENSITY:	NA	SIZE: NA		ABRASIVE: NA		
NATURE OF SOLIDS:				FLUID VAPOR PRESSURE: NA	FT. of FLUID @ P.T.			
DESIGN CAPACITY:	500 GPM AT	45 FT. at P.T.		DESIRED RANGE:	400 GPM TO 600 GPM			
SUCTION PRESS: -11 FT.	PSIG	DISCHARGE PRESS:	34 FT. PSIG	NPSH AVAIL: 22 FT. at P.T.				
PUMP SPECIFICATIONS								
TYPE PUMP: Horizontal end suction centrifugal, direct-connected				NO. STAGES: 1	RPM: 1800 (max.)			
TYPE IMPELLER: Semi-open, keyed to shaft				SIZE: IN.	MAX SIZE: IN.			
EFFICIENCY AT DESIGN CAPACITY: 70 (min)%		BHP @ DESIGN CAPACITY:		MAXIMUM BHP: 15				
TYPE BEARINGS:	Oil-lubricated, anti-friction							
TYPE COUPLING:	*Flexible coupling with coupling guard*			LUBRICATION:				
TYPE OF SEAL:	Mechanical (See Note 2)							
CONNECTIONS - SIZE & RATING								
SUCTION:	IN. 150 LB. Flange			DISCHARGE:	IN. 150 LB. Flanged			
VENT:	IN. LB.			DRAIN: 1/2	IN. NPT w/plugs			
CONSTRUCTION MATERIALS								
RESTRICTIONS:								
CASING:	Cast iron, radially split, with drain plugs			IMPELLER:	316 stainless steel			
SHAFT:	Alloy steel			SHAFT SLEEVE:	stainless steel			
CASE RING:				IMP. RING:				
BASE PLATE:	Cast iron with integral drain rim			RELIEF VALVE: NA				

ELECTRIC MOTOR

VOLTS	PHASE	HERTZ	H.P.	NON-OVERLOAD	CLASS	GROUP	RPM	TYPE
460	3	60	15 (max.)	Yes			1800 (max.)	TEFC

REMARKS:	Data sheet shall be completed as required.
	Pumps shall be in accordance with ASME B73.1M.
	Note 1: See Section 15170 for electric motor requirements.
	Note 2: Provide pressurized seal water system.

SECTION 15170
MOTORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Low-voltage, three phase induction motors.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 15160 - Transfer Pumps.

D. Section 16050 - Basic Electrical Materials and Methods.

E. Section 16170 - Grounding and Bonding.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. American Bearing Manufacturers Association (ABMA):

1. ABMA 9-90 — Load Ratings and Fatigue Life for Ball Bearings.
2. ABMA 11-90 — Load Ratings and Fatigue Life for Roller Bearings.

B. Institute of Electrical and Electronics Engineers (IEEE):

1. IEEE 112-91 — Standard Test Procedure for Polyphase Induction Motors and Generators.

C. National Electrical Manufacturers Association (NEMA):
1. NEMA MG 1-93 Motors and Generators.
2. NEMA MG 13-84 Frame Assignments for AC Integral-Horsepower Induction Motors.

D. National Fire Protection Association (NFPA):
1. NFPA 70 National Electrical Code, 1996 Edition.

E. Underwriters Laboratories, Inc. (UL):
1. Electrical Construction Materials Directory-96.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. Product Data: Provide full load amps, impedances, normal and short-circuit current ratings, NEMA frame size, and additional standard nameplate data. Provide efficiency and power factor for each of 1/2, 3/4, and full load. Provide dimensional enclosure details.

C. Test Reports: Indicate satisfactory completion of required tests and inspections. Submit results verifying performance in accordance with IEEE 112.

1.6 QUALITY ASSURANCE PROGRAM

A. Conform to NFPA 70 and NEMA MG 1.

B. Motors shall be listed in the UL Electrical Construction Materials Directory for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. Reliance Electric.
2. U. S. Motors.
3. General Electric.

2.2 EQUIPMENT

A. General Construction and Requirements

1. Electrical Service: Refer to related sections of the specifications and the drawings for required characteristics. Motors shall be suitable for driven equipment.
2. Motors: Design for continuous operation at a temperature of 40 degrees C ambient, and for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
3. Visible Nameplate: Indicating motor horsepower, voltage, phase, frequency, rpm, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, serial number, and bearing numbers. Nameplate shall be stainless steel, permanently attached to the motor frame.
4. Electrical Connection: Conduit connection boxes, threaded for conduit and designed to allow for 90-degree step rotation of the conduit entrance. Oversize conduit boxes shall be provided.
5. Motor Service Factor: Furnish motors with service factors required herein. Motor size in hp shall be selected to serve the driven equipment over its full performance range as though the service factor were 1.0.
6. Motors drawing less than 250 W that are intended for intermittent service may be germane to equipment manufacturer and need not conform to these specifications.

B. Three Phase - Squirrel Cage Induction Motors

1. Motors shall be 460 V, three phase, 60 Hz.
2. Motors shall have a 1.15 service factor or higher.
3. The motor connection diagram shall be stainless steel, permanently stamped and attached to the motor either inside the conduit box or on the same side as the conduit box.
4. Starting Torque: To be matched to the driven equipment.

5. Starting Current: Not to exceed six times full-load current.
6. Power Output, Locked Rotor Torque, Breakdown or Pullout Torque: NEMA Design B characteristics or as required by the driven equipment.
7. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors or as required by the driven equipment.
8. Insulation System: Non-hygroscopic NEMA Class F or better.
9. Testing Procedure: In accordance with IEEE 112, Test Method B. Load test motors to determine freedom from electrical or mechanical defects and for compliance with performance data.
10. Motor Frames: NEMA MG 13 standard T-frames of steel, or cast iron with end brackets of cast iron.
11. Bearings: Grease lubricated, anti-friction ball bearings with housings equipped with plugged provision for prelubrication, rated for minimum ABMA 9 and 11, L-10 life of 20,000 hours.
12. Sound Power Levels: To NEMA MG 1.
13. Motors shall be high-efficiency type.
14. Motors shall be totally enclosed fan cooled (TEFC), unless specified or indicated otherwise.
15. Nominal Efficiency: Meet or exceed values in schedules as given herein at full load and rated voltage when tested in accordance with IEEE 112.
16. Nominal Power Factor: Meet or exceed values in schedules as given herein at full load and rated voltage when tested in accordance with IEEE 112.

C. Performance Schedule: Three Phase - Energy efficient, TEFC.

HP Factor	RPM (Syn)	NEMA Frame	Minimum Percent Efficiency	Minimum Percent Power Factor
1-1/2	3600	143T	82	85
2	3600	145T	82	87
3	3600	145T	84	85
5	3600	182T	85	86
7-1/2	3600	184T	86	88
10	3600	213T	87	86
15	3600	215T	89	89
20	3600	254T	90	89
25	3600	256T	90	92
30	3600	284T	91	91
40	3600	286T	92	92
50	3600	324T	93	89
60	3600	326T	93	91
75	3600	364T	93	88
100	3600	365T	92	88
1	1800	143T	82	84
1-1/2	1800	145T	84	85
2	1800	145T	84	85
3	1800	182T	86	86
5	1800	184T	87	87
7-1/2	1800	213T	88	86
10	1800	215T	89	85
15	1800	256T	91	85
20	1800	256T	91	86
25	1800	284T	91	85
30	1800	286T	92	88
40	1800	324T	92	83
50	1800	326T	93	85
60	1800	364T	93	88
75	1800	365T	93	88
100	1800	404T	93	83

For motors larger than 100 hp or for operation at other rpm's, provide manufacturer's standard high-efficiency motor.

PART 3 EXECUTION

3.1 ERECTION/INSTALLATION/APPLICATION

A. Install motors in accordance with manufacturer's instructions.

B. Motors shall be aligned with the respective driven equipment as specified in related sections.

C. External metal frames of motors and their respective driven equipment shall be connected to ground.

3.2 TURN OVER

A. Upon completion of project, motors shall be turned over to Construction Manager in good working condition and transferred to designated site storage area.

END OF SECTION

U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

REMEDIATION AREA 1, PHASE II
SITE PREPARATION AND REMEDIATION PACKAGE
TECHNICAL SPECIFICATIONS

Division 16

PARSONS

Prepared by: _____

Date

Checked by: _____

Date

SECTION 16050
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Circuit Breaker for existing substation.

B. Disconnect switches.

C. Combination magnetic motor starters.

D. Selector switches.

E. Receptacles.

F. Relays.

G. Conduit.

H. Wire and cable.

I. Instrument cable.

J. Nameplates.

K. Wire markers and cable tags.

L. Wireway and auxiliary gutters.

M. Splicing and termination components.

N. Boxes.

O. Cabinets.

P. Supporting Devices.

Q. Underground Warning Tape.

R. Electrical Testing, General.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 02200 - Non-Impacted Material Excavation

D. Section 02206 - General Earthwork, Backfilling and Interim Grading.

E. Section 15160 - Transfer Pumps.

F. Section 15170 - Motors.

G. Section 16118 - Underground Ductbanks.

H. Section 16170 - Grounding and Bonding.

I. Section 16370 - Overhead Power Distribution.

J. Section 16462 - Dry Type Transformers/Panelboards.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI C80.1-90 Rigid Steel Conduit (RGS) - Zinc Coated.
2. ANSI C80.6-94 Intermediate Metal Conduit (IMC) - Zinc Coated.

B. InterNational Electrical Testing Association (NETA):

1. NETA ATS-95 Acceptance Testing Specification for Electrical Power Distribution Equipment.

C. National Fire Protection Association (NFPA):

1.	NFPA 70	National Electrical Code, 1996 Edition.

D. National Electrical Manufacturers Association (NEMA):

1.	NEMA AB 1-93	Molded Case Circuit Breakers and Molded Case Switches.
2.	NEMA ICS 1-93	Industrial Control and Systems General Requirements.
3.	NEMA ICS 2-93	Industrial Control and System Controllers, Contractors, and Overload Relays Rated Not More Than 2000 Volts AC or 750 Volts DC.
4.	NEMA ICS 4-93	Industrial Control and Systems Terminal Blocks.
5.	NEMA ICS 6-93	Industrial Control and Systems Enclosures.
6.	NEMA KS 1-90	Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
7.	NEMA OS 1-89	Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
8.	NEMA WD 1-83	General Requirements for Wiring Devices.
9.	NEMA WD 6-88	Wiring Devices - Dimensional Requirements.
10.	NEMA 250-91	Enclosures for Electrical Equipment (1,000 Volts Maximum).

E. Underwriters Laboratories Inc. (UL):

1.	UL 360-96	UL Standard for Safety Liquid-Tight Flexible Steel Conduit.
2.	UL 486A-91	UL Standard for Safety Wire Connectors and Soldering Lugs for Use with Copper Conductors.
3.	UL 510-94	UL Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.

4. UL 854-96 Service-Entrance Cables.
5. UL 870-95 UL Standard for Safety Wireways, Auxiliary Gutters, and Associated Fittings.
6. Electrical Construction Materials Directory - 96.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01010.

1.6 QUALITY ASSURANCE PROGRAM

A. Work shall comply with NFPA 70. Use of conduit for equipment ground is prohibited.

B. Products shall be listed in the UL Electrical Construction Materials Directory, for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. Molded Case Circuit Breaker for Existing Substation
1. NEMA AB 1 with integral thermal and instantaneous magnetic trip in each pole. Provide common trip handle for all poles. Terminals, minimum 75 degrees C rated.
2. Provide one Siemens ITE SBA800, circuit breaker with 800 AF, trip as indicated for existing Substation N18-2.
3. Substation N18-2 Nameplate Information: Siemens ITE RC III, Series 6, S. O. 17-18930-1, 480V/ 277Y, MAWF 3/93.

B. Disconnect Switches

1. Fusible Switch Assemblies: NEMA KS 1, Type HD quick-make, quick-break, visible blade, load interrupter knife switch in Type 12 enclosures, NEMA 250, with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: FS W-F-870. Designed to accommodate Class R fuses. Terminals, minimum 75 degrees C rated.

C. Combination Magnetic Motor Starters

1. Combination Magnetic Motor Starters: NEMA ICS 1, NEMA ICS 2, AC general purpose Class A magnetic starter for induction motors for the rated horsepower combined with a magnetic circuit breaker, NEMA AB 1, with instantaneous magnetic trip in each pole. Starter, circuit breaker, and control power transformer shall be in a common enclosure. Terminals, minimum 75 degrees C rated.
2. Provide externally operable handle interlocked to prevent opening of cover with circuit breaker in the ON position. Allow handle to be lockable in the OFF position.
3. Contactor Coil Operating Voltage: 120 V, 60 Hz.
4. Overload Relay: NEMA ICS 2, bimetal.
5. Control Power Transformer: 120 V secondary, 50 VA minimum. Provide fused primary and secondary of transformer, and ground unfused leg of secondary to enclosure.
6. Enclosure: NEMA ICS 6, Type 3R or 4, outdoor; or Type 12, indoor.
7. Heater elements shall be included, as required, for the described service conditions.
8. Two auxiliary contacts (electrically dry), one each, normally closed and normally open, in addition to the hold-in contact, shall be provided.

D. Selector Switches

1. Enclosure, NEMA ICS 6, Type 3R or 4.
2. Two-position, maintained contact (open/close), as indicated.

E. Receptacles

1. Convenience Receptacle: 125 V, 15/20 A, NEMA WD 1, heavy-duty, general use with metal cover plate; conforming to NEMA WD 6, Configuration 5-20. 125 V, 30 A, NEMA WD 1, heavy-duty, general use with metal cover plate; conforming to NEMA WD 6, Configuration 5-30. Furnish with weatherproof "while in use" covers for outdoors, wet or industrial locations.

F. Relays

1. Relays: NEMA ICS 2, contacts rated 5A at 120 V, octal plug-in type.

G. Cabinets

1. Boxes: Galvanized steel with removable endwalls.
2. Box Size: As indicated in Section 13401.
3. Fronts: Steel, surface type with concealed trim clamps, door with concealed hinge, and flush lock keyed to match branch circuit panelboard. Finish with gray baked enamel.
4. Knockouts: Provide as required for conduits indicated plus 25 percent spare.
5. Provide metal barriers to form separate compartments wiring of different systems and voltages.
6. Provide accessory feet for free-standing equipment.
7. Terminal Blocks: NEMA ICS 4.
   a. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.
   b. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.
8. Provide ground bus and ground terminal block, each connector bonded to enclosure.

9. Provide plastic channel with hinged or snap-on covers for internal wiring raceway.

2.2 MATERIALS

A. Conduit

1. Rigid steel, heavy wall, galvanized conduit conforming to ANSI C80.1. Intermediate metal conduit (IMC), conforming to ANSI C80.6, shall be acceptable for interior spaces. Conduit shall be 1/2-inch diameter minimum.
2. Liquid-tight flexible metal conduit conforming to UL 360. Conduit shall be 1/2 inch diameter minimum, 5 feet in length (maximum) unless indicated on drawings.
3. Conduit connections shall be threaded.

B. Wire and Cable

1. Single conductor, 600 volt insulated copper conductor. Conductors for power and lighting branch circuits shall not be smaller than No. 12 AWG. Conductors No. 14 AWG and larger shall be stranded. Conductors for control shall not be smaller than No. 14 AWG stranded. Conductors for Class 1 remote-control and signal circuits shall be enclosed in cable and shall comply with NFPA 70. Power and lighting conductor insulation shall be rated 90 degrees C in accordance with NFPA 70 shall be insulation Type THHN, THWN-2, XHHW, XHHW-2. Direct burial cable shall be type USE-2, conforming to UL 854.

C. Instrument Cable

1. Instrumentation cable shall be No. 16 AWG stranded tinned copper conductors. Conductors shall be polyethylene insulated and rated 600 volts, 60 degrees C. Conductors shall be twisted with aluminum-polymer shield; No. 18 AWG stranded, tinned copper drain wire. Cable shall have overall-chrome gray FR-PVC jacket.

D. Nameplates

1. Nameplates shall be engraved, three-layer laminated plastic, 5/16-inch bold style, black letters on white background.

E. Wire Markers and Cable Tags

1. Wire markers shall be single-conductor slip on, heat-shrinkable sleeve with typed or printed black letters on a white background. Wire markers shall be W. H. Brady Co. computer-printable "Bradysleeve" or approved equal.
2. Cable tags shall be rectangular, flat, non-heat shrinkable tags with 1/8-inch-high letters. Cable markers shall be Raychem-type TMS or approved equal.

F. Wireway and Auxiliary Gutters

1. Wireway and Auxiliary Gutters: General purpose, NEMA ICS 6, Type 3R enclosure with knockouts on bottom.
2. Size: As required.
3. Cover: Screw cover with full gasketing.
4. Fittings: UL 870, lay-in type with removable top, bottom, and side; captive screws.
5. Material: Carbon steel.
6. Finish: Rust-inhibiting primer coating with gray enamel finish.

G. Splicing and Termination Components

1. Wire connectors, UL 486A, as applicable.
2. Insulation tape, UL 510.
3. Provide solderless terminal lugs, rated 75 degrees C minimum, on stranded conductors.

H. Boxes and Cover Plates

1. Junction and Pull Boxes

a. Junction and pull boxes shall be sized as indicated in accordance with NFPA 70, Article 370.

b. Junction and pull boxes located indoors shall be code-gauge, galvanized sheet steel and shall be of welded construction with conduit knockouts or raceway openings and hinged or screwed covers as indicated. Type 3R, according to NEMA 250.

c. Junction and pull boxes located outdoors shall have screwed, gasketed covers, and watertight hubs. Type 3R, according to NEMA 250.

2. Device and Outlet Boxes

a. Device and outlet boxes shall be pressed steel, zinc, or cadmium coated in accordance with NEMA OS 1 unless otherwise indicated.

b. Outlet boxes shall not be smaller than 4 inches octagonal by 1-1/2 inches deep and shall be provided with the proper size knockouts for the conduits intended. Unused knockouts shall remain closed or shall be sealed with knockout closures.

c. Device or outlet boxes shall be of unit construction of a size required for the number of switches or outlets called for on the project design drawings. No sectional device boxes shall be permitted.

d. Surface-mounted outlet boxes for receptacles, switches, or similar devices shall be cast type.

I. Supporting Devices

1. Support Channel shall be galvanized or painted steel.

2. Support hardware and accessories shall be corrosion resistant.

3. Supports shall be of all-welded construction.

J. Underground Warning Tape

1. 4-inch-wide plastic tape, colored yellow with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.1 SITE CONDITIONS

A. Ensure site is ready to receive work before start of construction.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Conduit

1. Route conduit parallel or at right angles to building lines. Provide conduit supports at approximately 8-foot intervals. Route conduit so as not to create a hazard for tripping or to compromise head clearance. Minimum height above floor shall be 7 feet, 6 inches.
2. Cut conduit square using saw or pipecutter. Cut ends of conduit shall be reamed smooth.
3. Install no more than the equivalent of three 90 degree bends between junction boxes. Use hydraulic one-shot conduit bender or factory elbows for conduit diameter larger than 1-1/2 inch.
4. Use Form 8 conduit bodies to make sharp changes in direction. Avoid moisture traps, provide junction box with weep hole.
5. Provide cast metal boxes such as FS or FD in damp or wet locations.
6. Provide 1/8-inch nylon pull cord in empty conduits. Cap empty conduits to prevent entry of moisture and foreign objects.
7. Final conduit connections to motors or other vibrating equipment shall be made with approximately 3-foot liquid-tight flexible metal conduit.
8. Conduit and supports are to be field routed. They are not indicated explicitly on drawings.

B. Wire and Cable

1. Swab conduit before installing cable. Remove burrs, dirt, or other debris. For existing conduit, pull a mandrel through before pulling cable to verify roundness and bending radii.
2. When pulling cable into conduit, use wire pulling compound.
3. Splices shall be made only in outlet or junction boxes.
4. Provide equipment grounding conductor along with phase conductors in conduits.
5. Multiconductor cables shall contain an integral ground conductor.
6. Grounding conductors shall be connected to equipment with compression lugs. Grounding connections shall be made to clean, dry surfaces. Scale, rust, grease, and dirt shall be removed from surfaces to which grounding connections are to be made.
7. Conductors shall be color coded. Conductors No. 6 AWG and larger shall be identified using colored tape at terminals and splice points. Conductors No. 8 AWG and smaller shall be identified using colored insulation or jacket. Color coding shall be as follows:

480Y/277V	Phase A	Yellow
	Phase B	Orange
	Phase C	Brown
	Neutral (grounded)	Gray
	Ground	Green
208Y/120V	Phase A	Black
	Phase B	Red
	Phase C	Blue
	Neutral (grounded)	White
	Ground	Green
	Plant Fire	Red and Yellow
	Alarm System	Brown and Yellow

8. Install cables buried directly in earth in the following manner:

a. Excavate cable trenches according to Section 02200. Provide a minimum cable cover of 24 inches below finished grade for power conductors operated at 600 volts and less. Trenches shall be not less than 8 inches wide, and shall be in straight lines between cable markers. Cable plows shall not be used. Bends in trenches shall have a radius of not less than 36 inches. Where two or more cables are laid parallel in the same trench, space cables laterally at not less than 3 inches apart. Backfill and compact in accordance with Section 02206.

b. When rock is encountered, remove to a depth of at least 3 inches below the cable and fill the space with sand or clean earth free from particles larger than 1/4 inch.

c. Do not unreel and pull cables into the trench from one end. Unreel cable on grade and lift into position onto bedding as indicated.

d. Provide warning tape, minimum 12 inches above top of cable.

e. Bury cables directly in earth, except under roadways, where cables shall be installed in plastic ducts encased in concrete, as indicated. Slope ducts to drain.

f. Use heat shrink adhesive coated caps on cable ends or tape cable ends immediately after cutting to prevent moisture from entering the cable. Varnish the tape when cable is not expected to be connected for at least 72 hours.

g. Separate cables crossing other cables or metal piping from each other by not less than 12 inches of well tamped earth.

h. Provide cables in one piece without splices between connections except where the distance exceeds the lengths in which cables are manufactured.

i. Bends in cables shall have an inner radius not less than 12 times the cable diameter.

j. Leave a horizontal slack of approximately 3 feet in the ground on each end of cable runs, on each side of connection boxes, and at points where connections are brought aboveground. Where cable is brought aboveground, leave additional slack to make necessary connections.

k. Provide an identification slab at each change of direction of cable, over the ends of ducts or conduits which are installed under paved areas and roadways, and over each splice. Identification slabs shall be of concrete approximately 20 inches square by 6 inches thick and shall be set flat in the ground so that top surface projects not less than 3/4 inch, nor more than 1 1/4 inches aboveground. The concrete shall have a compressive strength of not less than 3000 psi and have a smooth troweled finish on exposed surface. Inscribe an identifying legend such as "electric cable" on the top surface before concrete hardens. Inscribe circuit numbers as indicated on drawings on slabs as directed. Letters or figures shall be approximately 2 inches high and grooves shall be approximately 1/4 inch in width and depth. Install slabs so that the side nearest the inscription on top shall include an arrow indicating the side nearest the cable.

C. Nameplates

1. Clean surfaces prior to installing nameplates.
2. Install nameplates parallel to equipment lines. Secure nameplates to equipment fronts using self-tapping screws.

D. Wire and Cable Markers

1. Provide wire markers on each conductor in pull boxes and junction boxes and at each load connection. Provide cable tags in pull boxes for multiconductor cables.
2. Wire and cable tags shall identify panel and circuit number or control wire number, as required.

E. Disconnect Switches

1. Mounting supports shall not be fastened to or penetrate wall panels.

F. Receptacles

1. Install convenience receptacles 48 inches above finished grade. Receptacle mounting supports shall not be fastened to or penetrate wall panels.
2. Label receptacles with panelboard and circuit number from which they are served.

G. Combination Magnetic Motor Starters

1. Install motor controllers where indicated on drawings.
2. Install motor controller with center line of disconnect operator 54 inches above finished grade.
3. Install overload heater element in motor controller to match motor characteristics.
4. Provide engraved nameplate identifying motor served.

H. Selector Switches and Pushbuttons

1. Mount selector switches at a mounting height of 54 inches above finished grade adjacent to the equipment controlled. Provide slotted channel mounting supports where building column or wall is not suitable for support.

I. Clearances

1. Clearances from points of access to electrical equipment and other devices shall conform to the requirements of NFPA 70.
2. Equipment control devices and other electrical equipment requiring operation or maintenance shall have a minimum working clearance of 3 feet from the surface of operation or access, unless greater clearance is required by NFPA 70.

J. Boxes

1. Coordination of Box Locations
   a. Provide electrical boxes as indicated and as required for splices, taps, wire pulling, and equipment connections.
   b. Electrical box locations indicated are approximate unless dimensioned.
   c. Locate and install boxes to allow access.
   d. Do not install boxes back to back in walls. Provide 6-inches (minimum) separation in non-acoustic rated walls and 24 inches (minimum) separation in acoustic rated walls.
   e. Coordinate mounting heights of boxes and locations of outlets mounted above counters, benches, and backsplashes to ensure locations are useful.
   f. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
2. Outlet Box Installation
   a. Firmly secure in place outlet or utility boxes concealed in the construction. Set outlet or utility boxes true, square, and flush with the finish surfaces for the application of the appropriate cover plate.
   b. Provide knockout closures for unused knockout openings.
   c. Support boxes independently of conduit except for cast boxes when connected to two rigid metal conduits, both supported within 12 inches of the box to be supported.

d. Use multiple gang boxes where more than one device is mounted together. Do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

3. Pull and Junction Box Installation

a. Support pull and junction boxes independently of conduit.

K. Cabinets

1. Install cabinet fronts plumb.

L. Supporting Devices

1. Installation of structural steel framing, concrete pads, etc., shall be complete before installing supporting devices.
2. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structures in accordance with manufacturer's recommendations as indicated.
3. Use expansion anchors for support on concrete surfaces.
4. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
5. Do not drill structural steel members for installing support devices.
6. Fabricate supports from structural steel or steel channel. Rigidly bolt to structural steel to present a neat appearance. Use hexagon head bolts with spring lock washers under nuts.
7. Install freestanding electrical equipment on concrete pads. Concrete shall conform to requirements for concrete in Section 16118.
8. Install surface mounted cabinets and enclosures with four anchors (minimum). Provide steel channel supports to stand cabinets and enclosures 1 inch from the wall.

3.3 QUALITY CONTROL

A. Electrical Inspection and Testing - General

1. Electrical inspection and testing for work in this section and in other electrical sections shall conform to the following requirements and to NETA

ATS. Tests required by NETA ATS for electrical work on this project shall be performed unless specific instruction is provided otherwise. Any additional requirements or exceptions shall be as noted in the other electrical sections for the specific electrical work of that section only.

2. Testing shall be witnessed by FDF, CQC Consultant-Quality Control personnel (who must approve results) and manufacturer's service representative(s), if required. Notice of testing must be furnished 7 days in advance.
3. Submit test results and calibration data on approved forms.
4. Perform operational tests to demonstrate control and interlocking wiring.
5. Visual inspections shall be performed for phasing and connections. Phasing shall be A, B, C clockwise at all three phase disconnects.
6. Repair or replacement of components where test results are unacceptable, including those damaged during testing process, is required.

B. Electrical Inspection and Testing - This Section

1. Perform continuity and operation tests on power and control circuits. Low voltage thermographic survey of cable connections required by NETA ATS are not required. Wire insulation for conductors No. 6 AWG and larger shall be megger tested between each conductor and ground. A 1000-volt megger shall be used for insulation rated 600 volts. Minimum resistance shall be 100 megohms.
2. Insulation resistance tests shall not be performed on solid state equipment unless authorized by its manufacturer and in strict accordance with the manufacturer's recommendations. Solid state equipment includes static ground fault devices, such as ground fault circuit interrupters.
3. Confirm that electrical connections to utilization equipment have been made in accordance with manufacturer's instructions.
4. Perform motor tests according to NETA ATS.
5. Motor windings shall be checked for continuity.

6. Motor windings rated 460 volts nominal shall be megger tested with a 1,000-volt megger prior to connection of power leads. Minimum acceptable resistance shall be 100 megohms. Motor and phase rotation shall be checked with a phase rotation tester manufactured by G. Biddle Company (Catalog No. 56060) or equal on equipment which could be damaged by reverse rotation.
   a. Motor and phase rotation shall be verified before energizing motors.
   b. Motors shall be "bumped" to check for proper direction of rotation prior to performing operational tests on the equipment in the presence of FDF.

END OF SECTION

SECTION 16118
UNDERGROUND DUCTBANKS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Underground Ductbanks.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 02200 - Non-Impacted Material Excavation.

D. Section 02206 - General Earthwork, Backfilling and Interim Grading.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. Institute of Electrical and Electronic Engineers (IEEE):
   1. IEEE C2-97 — National Electrical Safety Code.

B. National Fire Protection Association (NFPA):
   1. NFPA 70 — National Electrical Code, 1996 Edition.

C. National Electrical Manufacturers Association (NEMA):
   1. NEMA TC 3-90 — PVC Fittings for Use with Rigid PVC Conduit and Tubing.
   2. NEMA TC 6-90 — PVC and ABS Plastic Utilities Duct for Underground Installation.

D. Underwriters Laboratories, Inc. (UL):
   1. Electrical Construction Materials Directories, 1996.

E. State of Ohio, Department of Transportation (ODOT): Construction and Material Specifications, January 1, 1997.

1.5 PROJECT CONDITIONS

A. Accurately record actual locations of exact routing of ductbank by field survey.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70 and IEEE C2.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.8 PROJECT CONDITIONS

A. Verify routing and termination locations of ductbank prior to excavation for rough-in.

PART 2 PRODUCTS

2.1 MATERIALS

A. Plastic Utilities Duct: NEMA TC 6; PVC.

B. Plastic Utility Duct Fittings: NEMA TC 3.

2.2 ACCESSORIES

A. Underground Warning Tape: 4-inch-wide plastic tape, colored yellow with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavation, base material installation, and compaction are completed.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Underground Duct:

1. Install power ductbank 36 inches (minimum) to top of ductbank below finished grade.
2. Install duct with minimum slope of 4 inches per 100 feet.
3. Cut duct square using saw or pipe cutter; de-burr cut ends.
4. Insert duct to shoulder of fittings; fasten securely.
5. Join nonmetallic duct using adhesive as recommended by manufacturer.
6. Wipe nonmetallic duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
8. Provide suitable fittings to accommodate expansion and deflection where required.
9. Terminate duct at manhole entries using end bell.

10. Stagger duct joints vertically in concrete encasement 6 inches minimum.
11. Use suitable separators and chairs installed not greater than 4 feet on centers.
12. Band ducts together before placing concrete.
13. Securely anchor duct to prevent movement during concrete placement.
14. Concrete shall conform to ODOT Item 499, Class F, 3000 psi and Item 511.
15. Provide minimum 3-inch concrete cover at bottom, top, and sides of ductbank.
16. Provide pull rope in each duct except sleeves and nipples. Minimum 1/2-inch, 4,000 psi tensile strength polypropylene.
17. Swab duct. Use suitable caps to protect installed duct against entrance of dirt and moisture.
18. Excavate and backfill trenches under provisions of Sections 02200 and 02206 of this specification package.
19. Interface installation of underground warning tape with backfilling. Install tape below finished surface as indicated on drawings.

END OF SECTION

SECTION 16170
GROUNDING AND BONDING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 15170 - Motors.

D. Section 16050 - Basic Electrical Materials and Methods.

E. Section 16370 - Overhead Power Distribution.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. InterNational Electrical Testing Association (NETA):
   1. NETA ATS-95 Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

B. National Fire Protection Association (NFPA):
   1. NFPA 70 National Electrical Code, 1996 Edition.

C. Underwriters Laboratories, Inc. (UL):
1. UL 467-93 UL Standard for Safety Grounding and Bonding Equipment.
2. Electrical Construction Materials Directory-96.

1.5 SYSTEM DESCRIPTION

A. Rod electrode and grounding connections.

B. Grounding System Resistance: 5 ohms maximum.

1.6 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. Provide certification of ground testing instrumentation.

C. Provide record of as-built locations of grounding electrodes, if grounding electrodes are required.

1.7 QUALITY ASSURANCE PROGRAM

A. Conform to requirements of NFPA 70.

B. Furnish products listed in the UL Electrical Construction Materials Directory as suitable for the purpose specified and indicated.

C. Provide certification of ground testing instrumentation according to NETA ATS.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers
1. Mechanical Connectors
a. Burndy.
b. Ideal.
c. Ilsco.

2. Exothermic Connections
   a. Cadweld.
   b. Thermoweld.

2.2 MATERIALS

A. Rod Electrode
1. Copper-clad steel, 3/4-inch diameter, 10-foot length.

B. Mechanical Connectors
1. Bronze.

C. Wire
1. Stranded copper.
   a. Grounding Conductor: Size to meet NFPA 70 requirements.

D. Grounding and bonding materials shall conform to UL 467.

PART 3 EXECUTION

3.1 SITE CONDITIONS

A. Verify that final backfill and compaction have been completed before driving rod electrodes.

B. Verify that underground utilities will not interfere with the proposed rod locations prior to driving rod electrodes.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Install products in accordance with manufacturer's instructions.

B. Install additional rod electrodes as required to achieve specified resistance to ground.

C. Equipment Grounding Conductor: Provide separate, insulated conductor with each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

D. Connect ground conductors to reinforcing bars in foundation before pouring concrete. Tie to structural steel members when they are installed, by exothermic connection.

E. Ground metal equipment enclosures by attachment to ground rod system, the building steel, or existing periphery grounding system.

F. Ground pole-mounted equipment and static line conductors as indicated on the drawings.

G. Drive ground rods until the top is 12 inches below grade.

3.3 QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation as defined by contract documents and manufacturer's instructions. Accurately record as-built locations of grounding electrodes if required, and submit to FDF. Test instrumentation shall conform to NETA ATS. Provide certification for instrumentation.

B. Measure the system's resistance to the ground; perform testing in accordance with instrument manufacturer's recommendations using the fall-of-potential method. Measure resistance at each pole and at each 480 V service as a minimum. Provide written test reports indicating overall resistance to ground and resistance of each electrode to ground.

END OF SECTION

SECTION 16370
OVERHEAD POWER DISTRIBUTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Poles.

B. Pole hardware.

C. Line conductors.

D. Anchors.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 16050 - Basic Electrical Materials and Methods.

D. Section 16170 - Grounding and Bonding.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. National Fire Protection Association (NFPA):
1. NFPA 70 National Electrical Code, 1996 Edition.

B. American National Standards Institute (ANSI):

1.	ANSI C2-97	National Electrical Safety Code.
2.	ANSI C135.1-79	Galvanized Steel Bolts and Nuts for Overhead Line Construction.
3.	ANSI O5.1-92	Wood Poles Specifications and Dimensions.

C. American Society for Testing and Materials (ASTM):

1.	ASTM A36/A36M-96	Standard Specification for Carbon Structural Steel.
2.	ASTM A475-95	Standard Specification for Zinc-Coated Steel Wire Strand.
3.	ASTM D698-91	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

D. American Wood-Preservers Association (AWPA):

1.	AWPA C4-89	Poles - Pressure Process.
2.	AWPA C25-89	Standard for the Preservative Treatment of Crossarms by the Pressure Process.

E. National Electrical Manufacturers Association (NEMA):

1.	NEMA WC 7-88	Cross-Linked Thermosetting Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

G. Underwriters Laboratories, Inc. (UL):

1.	UL 96-94	UL Standard for Safety Lightning Protection Components.
2.	Electrical Construction Materials Directory-96.	

1.5 QUALITY ASSURANCE PROGRAM

A. Conform to requirements of NFPA 70 and ANSI C2.

B. Furnish products, where available, listed in the UL Electrical Construction Materials Directory, as suitable for the purpose specified and indicated.

C. Installation shall comply with ANSI C2, Heavy Loading District, Grade B Construction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect poles from damage and decay by stacking to provide free circulation of air. Maintain 1 foot minimum spacing between bottom pole and ground or ground vegetation. Do not store poles above decayed or decaying wood.

B. Stack poles stored for more than 2 weeks on decay-resistant skids arranged to support poles without noticeable pole distortion.

C. Handle treated poles with tools which will not produce an indentation greater than 1 inch deep. Do not drag treated poles along ground. Do not apply tools to that section of treated poles between 1 foot above and 2 feet below ground line.

PART 2 PRODUCTS

2.1 MATERIALS

A. Poles

1. Wood Poles: ANSI O5.1; treated southern pine poles of length and class indicated.
2. Select poles for straightness, minimum sweeps, and short crooks.
3. Preservative: ANSI O5.1 and AWPA C4, Pentachlorophenol.
4. Apply preservative to poles as required by AWPA C4 with minimum net retention of 12 lbs/ft^3 (285 kg/m^3). Obtain complete sapwood penetration.

B. Pole Hardware

1. Miscellaneous Pole Hardware: Hot-dipped galvanized after fabrication.
2. Eye Bolts and Nuts: ANSI C135.1.
3. Ground Rods: Copperweld 3/4 inch O.D. by 10 foot - 0 inches long.
4. Guy Strand: High strength, seven-strand steel cable galvanized to ASTM A475, Class A or B.
5. Guy Termination: Preformed wire type.
6. Guy Guards: 8-foot (2 m) long plastic, colored yellow.
7. Ground Wire: Soft drawn solid copper conductors, 4 AWG minimum size.
8. Air Terminal: UL 96; 18-inch copper air terminal.
9. Guy Adapter: Tripleye.

C. Line Conductors

1. Secondary Conductors: aluminum, three insulated conductors and messenger/ground wire with 600 volt cross-linked polyethylene insulation for phase conductors conforming to NEMA WC 7.

D. Anchors

1. Helical Screw Anchors: Galvanized steel, ASTM A36/36M.

PART 3 EXECUTION

3.1 SITE CONDITIONS

A. Verify that field measurements are as shown on drawings.

B. Verify that there are no underground utilities located below the poles prior to installation.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Install products in accordance with manufacturer's instructions.

B. Plug unused holes in poles using treated wood dowel pins. Treat field-cut gains and field-bored holes with preservative.

C. Shorten poles when required by cutting from top end. Apply hot preservative to shortened end of pole.

D. Set poles in straight line. Place curved poles with curvature in line with lead pole. Maintain an even grade.

E. Dig setting holes large enough to permit use of power tampers to full depth. Place earth in maximum 6-inch layers and pack to 95 percent density per ASTM D698.

F. Rake poles located at corners, angles, and dead ends so that poles are vertical after line installation.

G. Do not install poles along the edge of cuts and embankments or where soil may be washed out.

H. Identify each pole using aluminum marker stamped with characters 2-1/2 inches high, minimum. Locate to provide maximum visibility from roadway and fasten with aluminum nails. Obtain identifying numbers from FDF.

I. Minimum depths in normal firm ground, measured from lower side of pole:

OVERALL LENGTH	DEPTH FOR STRAIGHT LINES	DEPTH AT CURVES, CORNERS, AND POINTS OF EXTRA STRAIN
30'	5'-6"	5'-6"
35'	6'-0"	6'-0"
40'	6'-6"	6'-6"
45'	7'-0"	7'-6"
50'	7'-6"	8'-0"
55'	7'-6"	8'-0"

J. Set crossarms at right angles to line for straight runs; and to bisect the angle of turns in line direction.

K. Provide two braces for each crossarm.

L. Install conductors to ANSI C2. Maintain clearances required by ANSI C2, except as follows: phase to phase - 20 inches, phase to ground - 16 inches, above roads, 480 V conductors - 23 feet, over buildings, all conductors, 8 feet. Conductor arrangement shall be phase A, B, C from north to south and from east to west for horizontal construction.

M. Conductor taps shall be made with bail clamps and hot line connectors using compression connectors. Taps shall not be made directly on line conductors. Make aluminum connections to copper or other material using only splices, connectors, lugs, or fittings designed for that specific purpose.

N. Install guys and anchors according to ANSI C2 requirements.

O. Use small diameter steel probe to verify area is free of underground obstructions prior to installation of anchors.

P. Bond metal enclosures on poles to pole ground wire in accordance with NFPA 70, ANSI C2 and manufacturer's instructions.

Q. After initial energizing of transformers, measure the secondary voltage and adjust to nominal voltage by changing taps.

END OF SECTION

SECTION 16462
DRY TYPE TRANSFORMER/PANELBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Dry type, two-winding transformers integrated with primary and secondary main breakers and feeder breakers.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 01011 - Submittals.

C. Section 16050 - Basic Electrical Materials and Methods.

D. Section 16170 - Grounding and Bonding.

1.3 REFERENCE DRAWINGS

A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES

A. InterNational Electrical Testing Association (NETA):
   1. NETA ATS-95 — Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

B. National Electrical Manufacturers Association (NEMA):
   1. NEMA AB 1-93 — Molded Case Circuit Breakers and Molded Case Switches.
   2. NEMA PB 1-90 — Panelboards.
   3. NEMA PB 1.1-91 — General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.

4. NEMA ST 20-92 — Dry Type Transformers for General Applications.

5. NEMA 250-91 — Enclosures for Electrical Equipment (1000 Volts Maximum).

C. National Fire Protection Association (NFPA):
1. NFPA 70 — National Electrical Code, 1996 Edition.

D. Underwriters Laboratories, Inc. (UL):
1. Electrical Construction Materials Directory-95.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01011.

B. Product Data: Include outline and support point dimensions of enclosures and accessories; unit weight; voltage; kVA, number of phases, impedance ratings, and characteristics; X/R ratio; tap configurations; insulation system type; rated temperature rise; and main bus ampacity, integrated short circuit ampere rating, circuit breaker, arrangement, and sizes.

C. Transformer Test Reports:
1. Factory Test: NEMA ST 20. Indicate loss data; efficiency at 25, 50, 75, and 100 percent rated loads; and sound level.
2. Field Test: Indicate primary and secondary voltages as measured.

1.6 QUALITY ASSURANCE PROGRAM

A. Conform to requirements of NFPA 70.

B. Furnish products listed in the UL Electrical Construction Materials Directory for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver transformers/panelboards individually wrapped for protection and mounted on shipping skids.

B. Accept transformers/panelboards on site. Inspect for damage.

C. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

D. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer/panelboards' internal components, enclosure, and finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Siemens.

B. Westinghouse.

C. Square D.

2.2 EQUIPMENT

A. Two-winding transformers

1. Description: NEMA ST 20, factory-assembled, air-cooled, dry type transformers; ratings as indicated on contract drawings.
2. Insulation system and average winding temperature rise for rated kVA as follows:
   a. 1-30 kVA: Class 185 with 115 degrees C rise.
   b. 16-500 kVA: Class 220 with 115 degrees C rise.
3. Case Temperature: Do not exceed 40 degrees C rise above ambient at warmest point.

4. Winding Taps:
   a. Transformers: NEMA ST 20. Transformers shall have four full current taps, two at 2-1/2 percent each above and two at 2-1/2 percent each below normal voltage.
5. Sound Levels: NEMA ST 20, not to exceed 85 dBA at 3 feet.
6. Basic Impulse Level: 10 kV.
7. Ground core and coil assembly to enclosure by means of a visible, flexible copper grounding strap.
8. Mounting: Suitable for wall mounting.
9. Coil Conductors: Continuous windings with terminations brazed or welded.
10. Enclosure: NEMA ST 20. Provide lifting eyes or brackets.
11. Isolate core and coil from enclosure, using vibration-absorbing mounts.
12. Nameplate: Include connection data and overload capacity based on rated allowable temperature rise.

B. Branch Circuit Panelboards
1. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type.
2. Enclosure: NEMA PB 1; Type 3R conforming to NEMA 250.
3. Cabinet Size: As shown on manufacturer's drawings.
4. Cabinet Front: Hinged cover with paddle lock hinge.
5. Provide an integrated unit with transformer. Finish in manufacturer's standard gray enamel.
6. Provide panelboards with copper bus, ratings as scheduled on drawings. Provide copper ground bus in each panelboard.
7. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical.

8. Molded Case Circuit Breakers: NEMA AB 1; plug-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, rated for 75 degrees C copper conductors. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where required. Provide 20 percent spare breakers installed in the panelboard.

PART 3 EXECUTION

3.1 ERECTION/INSTALLATION/APPLICATION

A. Install transformer/panelboards in accordance with NEMA PB 1.1.

B. Install plumb, and in accordance with manufacturer's instructions, and as indicated on contract drawings.

C. Height: 6 feet, 6 inches to top of transformer section.

D. Provide grounding connections in accordance with Section 16170.

E. Provide filler plates for unused spaces in panelboards.

F. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

G. Provide engraved plastic nameplates identifying transformer/panelboard equipment number.

H. After initial energizing of transformers, measure the secondary voltage and adjust to nominal voltage by changing taps.

3.2 QUALITY CONTROL

A. Test according to general requirements of Section 16050 and to the relevant requirements of NETA ATS.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, grounding, and conformance of installation to contract documents and manufacturer's instructions. Check tightness of wiring and mounting connections for circuit breakers and transformer prior to energizing.

C. Record primary and secondary voltages; submit to FDF.

D. Measure steady state load currents at each panelboard feeder. Rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION